10

USAF Declass/Release Instructions On File

ACCIDENT FOLDER

SR-71

61-7952

25 JAN 66

Excess copy
was destroyed
13 Nov 70
KV

25X1A [redacted]

ASD/OSA
5384
1 MARCH 66

SECRET

25X1A [redacted]

DIRECTOR

9	AD/TECH/OSA
5	D/TECH/OSA
4	D/OSA
5	OXC/OSA
6	D/FA/OSA
7	EB/OSA
8	oxc

	DEFERRED	PRIORITY	IMMEDIATE
X	ROUTINE	OPERATIONAL IMMEDIATE	PRIORITY

25X1A [redacted]

OXCART

REF: [redacted] 5425 (IN 90659) 25X1A

5524

1. REF PARA 9. PLEASE FORWARD YOUR DRAWINGS 4AQ455, 6 AND 7.

2. REF PARA 12. HEADQUARTERS INTERESTED IN YOUR STUDY ON THE X-15 FACE PLATE HEAT SYSTEM. WOULD APPRECIATE BEING INFORMED ON YOUR CONCLUSIONS.

3. REF PARA 15. PLEASE ADD INSTRUCTIONS FOR LAP BELT INSPECTION TO APPROPRIATE A-12 MANUAL.

END OF MESSAGE

25X1A [redacted]

AD/TECH/OSA

COORDINATING OFFICERS

25X1A [redacted]

MAJOR USAF
ASD/OSA

RELEASING OFFICER

SECRET

AUTHENTICATING OFFICER

FORM 124 3-53 USE PREVIOUS EDITIONS

MFG. 1-65

CLASSIFICATION/MESSAGE

SECRET

ROUTING

1		9	
2		10	
3		11	
4		12	
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6		14	
7		15	
8		16	

DATE 2303Z 04 MAR 66

ROUTINE

TO DIRECTOR

FROM [redacted] 25X1A

ACTION:

INFO

ROUTING	INT
1	
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3	
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8	
9	
10	OSA 1-20

cy HC
cy ~~Ed~~ JP
cy SME

IN-91746

TOR 2335Z 04 MAR 66

TO [redacted] 25X1A INFO CITE [redacted] 5449

25X1A

OXCART

REF: [redacted] 25X1A

ATTN: [redacted]

1. DRAWINGS 4AQ455, 6 AND 7 IN MAIL TO YOU.

2. WILL COMPLY.

3. INSTRUCTIONS HAVE BEEN ADDED TO A-12 MANUAL 3 MARCH 1966 BY TDC 24, 25 AND 26.

4. SERVICE BULLETIN 1024 RELEASED FOR A-12 WHICH PROVIDES SPACERS REFERRED TO IN PARAGRAPH 14 OF [redacted] 5425.

END OF MSG

25X1A

SECRET

GROUP 1
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 COPY NO.

SECRET

D/Tech CD
DD/SA
RB
OXC
"
MD
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DIFA

ROUTING INT

DIRECTOR

[redacted] 25X1A

ROUTINE

FOR 19517 28 FEB 66

IN 90659

25X1A 25X1A

PRIORITY [redacted] [redacted] 5425

25X1A [redacted]

25X1A REF: [redacted] 3794, DATED 18 FEB. 1966

25X1A TO: [redacted] FROM: KELLY JOHNSON

FOLLOWING IS A SUMMARY OF ADP ACTIONS AND COMMENTS AS REQUIRED IN REFERENCE. IT IS UNDERSTOOD THAT THESE ITEMS WILL BE DISCUSSED IN GREATER DETAIL IN THE MEETINGS WITH [redacted] 25X1A

25X1A [redacted] 3 MARCH.

1. TDC NUMBER 5 REFLECTS REVISED FLIGHT OPERATING LIMITS FOR THE SR-71 AIRCRAFT. TDC NUMBER 11 REFLECTS THE REVISED LIMITS FOR THE SR-71B AIRCRAFT. CONTINUE CATEGORY I FLYING IS BEING CONDUCTED TO OBTAIN ADDITIONAL DATA AS THE BASIS FOR FUTURE EXPANSION OF THE FLIGHT OPERATING ENVELOPE.

2. ADP RECOMMENDS FOR IMMEDIATE AND INTERIM USE EXPANDED USE OF THE PITCH TRIM INDICATOR LOCATED ON THE LOWER LEFT CENTER FORWARD INSTRUMENT PANEL. THIS IS THE BEST AND MOST RELIABLE DIRECT INDICATION AVAILABLE TO THE PILOT AS TO ACTUAL AIRCRAFT LONGITUDINAL STABILITY. INSTRUCTIONS FOR THE MOST EFFECTIVE USE

SECRET

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 COPY NO. 1

OF THE INDICATOR ARE BEING EXPANDED IN A REVISION TO THE -1 HANDBOOK. FOR LONGER RANGE SOLUTION, WORK IS BEING ACCELERATED UNDER ECP ON THE DIRECT READING CG INDICATOR WHICH IS A PART OF THE IMPROVED FUEL GAGING SYSTEM. THE INTERCHANGEABLE TANK PROBE UNITS HAVE BEEN RECEIVED AND ARE BEING QUALIFICATION TESTED AT ADP. A COMPLETE SYSTEM FOR INSTALLATION ON CATEGORY I AIRCRAFT WILL BE AVAILABLE IN APRIL. PRODUCTION AND RETROFIT EQUIPMENT DELIVERIES CAN BE AVAILABLE IN SEPTEMBER.

3. IN-FLIGHT CAPABILITY FOR FORWARD MOVEMENT OF FUEL EXISTS IN PRESENT CONFIGURATION. TEST INSTALLATION IN CATEGORY I AIRCRAFT PERMITS AFT FUEL TRANSFER. OPERATIONAL USE OF AFT TRANSFER WOULD REQUIRE GREAT CARE TO AVOID INADVERTENT AFT CG EXCURSIONS. IN FACT, IT IS MY DEFINITE OPINION THAT USE OF AFT TRANSFER OF FUEL IS QUITE DANGEROUS AND WE HAVE AVOIDED IT DEFINITELY FOR THIS REASON.

4. FOLDERS HAVE BEEN PREPARED FOR EACH ADP FLIGHT CREW MEMBER AND THESE WILL BE MAINTAINED AND UTILIZED IN THE FUTURE FOR STANDARDIZATION AND EVALUATION PURPOSES.

5. THE FUEL SCHEDULING FOR VARIOUS PAYLOADS IS OBTAINED BY PROPER TANK FLOAT VALVE SELECTIONS TO THE "CHRISTMAS TREE" SWITCHES. CURRENT CATEGORY I FLIGHT TEST ACTIVITIES ARE BEING CONDUCTED WITH MODIFICATIONS TO THE FUEL SEQUENCING AND CONTROL SYSTEM IN AN EFFORT TO DEVELOP MORE PRECISE CG CONTROL. THE PROGRESS OF THESE FLIGHT TESTS WILL BE THE BASIS FOR RECOMMENDATION OF FUTURE IMPROVEMENTS TO THE FUEL SCHEDULING SYSTEM.

6. SERVICE BULLETINS R-212 AND R-298 ARE BEING ACCOMPLISHED

ON ALL AIRCRAFT TO IMPROVE THE BASIC WIRING RELIABILITY. A PROGRAM FOR INCORPORATING RELIABILITY IMPROVEMENTS IN THE INLET CONTROL COMPUTER AND PRESSURE RATIO TRANSDUCERS WAS INITIATED PRIOR TO THE ACCIDENT. FLIGHT TESTS ARE EVALUATING THE ADDITION OF ALPHA OR G COMPENSATING CIRCUITS TO INCREASE THE UNSTART MARGIN IN MANEUVERS. THE CATEGORY I PROGRAM DEVELOPMENT WORK ON SPIKE AND BYPASS SCHEDULES WILL RESULT IN FUTURE RECOMMENDATIONS FOR IMPROVED AERODYNAMIC PERFORMANCE AND IMPROVED UNSTART MARGIN.

7. THE R-12 FLIGHT LOADING SHEET WILL BE REVISED TO PROVIDE CROSS CHECK PROCEDURES AND ENTRY OF CALCULATIONS. THIS FLIGHT LOADING SHEET IS A DEVELOPMENT FROM DD FORM 375F FOR THE SR-71 VEHICLE.

8. ADP HAS REVIEWED DD FORMS 829 AND 829-1 FOR ALL TEST AND PRODUCTION AIRCRAFT TO INSURE THAT ENTRIES RELATED TO THE INLET CONTROL SYSTEM ARE COMPLETE AND CURRENT.

9. APPROXIMATELY FIFTEEN BELTS WERE GIVEN STATIC AND DYNAMIC STRENGTH TESTS. AN INCREASE TO STRENGTH OF APPROXIMATELY FIFTEEN PERCENT CAN BE OBTAINED BY MINOR MODIFICATION:

A. REMOVE SHARP CORNERS FROM THE ROLLER BAR.

B. ADD RADIUS TO THE FLAT METAL PART OF THE BUCKLE WHERE THE ROLLER PUTS PRESSURE ON THE BELT.

C. INSURE THAT THE FLAT METAL PORTION OF THE BUCKLE IS STRAIGHT AND PARALLEL TO THE ROLLER BAR.

D. ADD A THIN NYLON CLOTH LINER TO THE TOP SIDE OF THE BELT TO REDUCE CUTTING.

THESE CHANGES ARE SHOWN ON ADP DRAWINGS 4AQ455, 6, AND 7. THEY WILL BE TRANSMITTED TO YOU FOR YOUR INFORMATION AND ACTION. AS THIS IS A

OF AE PART.

10. THE STABILIZED SEAT DEVELOPMENT IS CONTINUING, WITH PRODUCTION INCORPORATION SCHEDULED AT SERIAL 2017. RETROFIT KITS ARE AUTHORIZED.

11. THE OXYGEN HOSES WILL BE REMOVED FROM THE FRONT OF THE SUIT AS A PART OF THE SUIT IMPROVEMENT CHANGES COORDINATED WITH THE STABILIZED SEAT CHANGE.

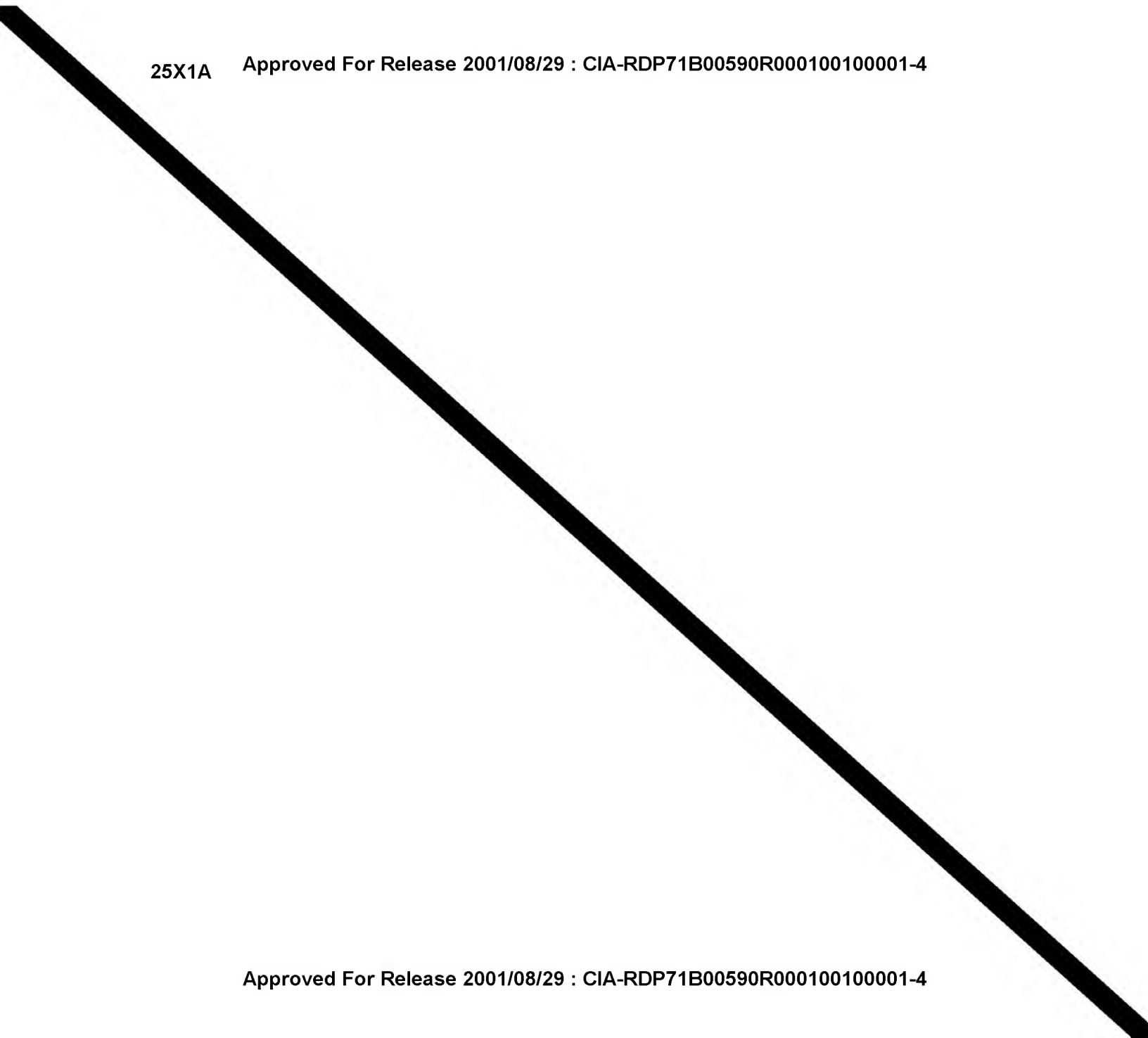
12. ADP IS CURRENTLY INVESTIGATING THE X-15 FACE PLATE HEAT SYSTEM. THE RESULTS OF THESE TESTS WILL BE REPORTED AS BASIS FOR FUTURE CHANGE.

13. ADP DOES NOT FAVOR AUTOMATIC SEAT EJECTION FOR REASONS TOO INVOLVED TO DISCUSS HEREIN. HOWEVER, OUR STUDY DOES INDICATE THAT IT IS PROBABLY DESIRABLE TO TIE FRONT AND REAR EJECTION SYSTEMS TOGETHER SO THAT REAR MAN IS AUTOMATICALLY EJECTED ABOUT ONE SECOND AFTER PILOT EJECTS. THIS IS EXTEMELY IMPORTANT FOR LOW ALTITUDE EJECTIONS. IT COULD BE SET UP WITH A MANUAL SHUTOFF AVAILABLE TO THE FCO IF DESIRED.

14. ADP IS DESIGNING SPACERS WHICH WILL PROVIDE SELECTIVE CREW ADJUSTMENT IN SEAT POSITION, BACK POSITION AND HEAD REST POSITION. IT IS PROPOSED TO AUTHORIZE THE SELECTIVE USE OF THESE SPACERS TO BE FITTED AND CONTROLLED BY THE PHYSIOLOGICAL EQUIPMENT OFFICER. THE PROPOSAL WILL BE SUBMITTED TO SPO SHORTLY.

15. LAP BELT INSPECTION. INSTRUCTIONS ARE BEING ADDED TO THE SR-71 -6 MANUAL FOR PERFORMANCE OF PREFLIGHT LAP BELT INSPECTION.

END OF MESSAGE



SCA

D/FA
AD/FA
OXC

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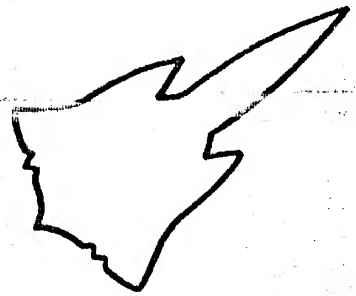
REPORT OF

MAJOR AIRCRAFT ACCIDENT



TYPE: SR-71

SN: 61-7952

DATE: 25 JAN 1966

TIME: 1432 MST

PLACE: 350°/107
CANNON AFB, N.M.

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COPY NR. 5

DEPARTMENT OF THE AIR FORCE
Headquarters United States Air Force
Washington, D.C.

Reply to Attn of: Directorate of Aerospace Safety
USAF
Norton Air Force Base, California 92409

Subject: Letter of Transmittal, Major Aircraft Accident Involving Desert Queen Aircraft, 25 January 1966, Northeast of Tucumcari, New Mexico

TO:		Copy Nr.
	AFIAS, Norton AFB	1
	AFFTC (FTTA), Edwards AFB	2
	SAC through 15AF Offutt AFB	3
	ASD (ASZB), WPAFB, Ohio	4
	AFRDR	5&6
	4200 SRW, Beale AFB	7

1. This report is transmitted in accordance with special instructions regarding Desert Queen aircraft, Department of Defense letter, Deputy Inspector General, Norton AFB, California (AFIAS-F), dated 24 January 1966.

2. ASD (ASZB, Col Templeton all copies) will initiate action in accordance with paragraph 19, AFR 127-4 and forward the indorsement to Directorate of Aerospace Safety (AFIAS-F, Lt Col Rothwell all copies).

3. 15AF for Col Simpson all copies will review the report and forward to SAC for DOSD Col Bacalis all copies, for review and file.

4. This report is classified SECRET as it contains classified information pertaining to Desert Queen aircraft. When the attached report is removed, this correspondence may be downgraded to Unclassified.

James G Fussell

JAMES G FUSSELL, Colonel, USAF
Board President

USAF ACCIDENT/INCIDENT REPORT
CHECKLIST AND INDEX

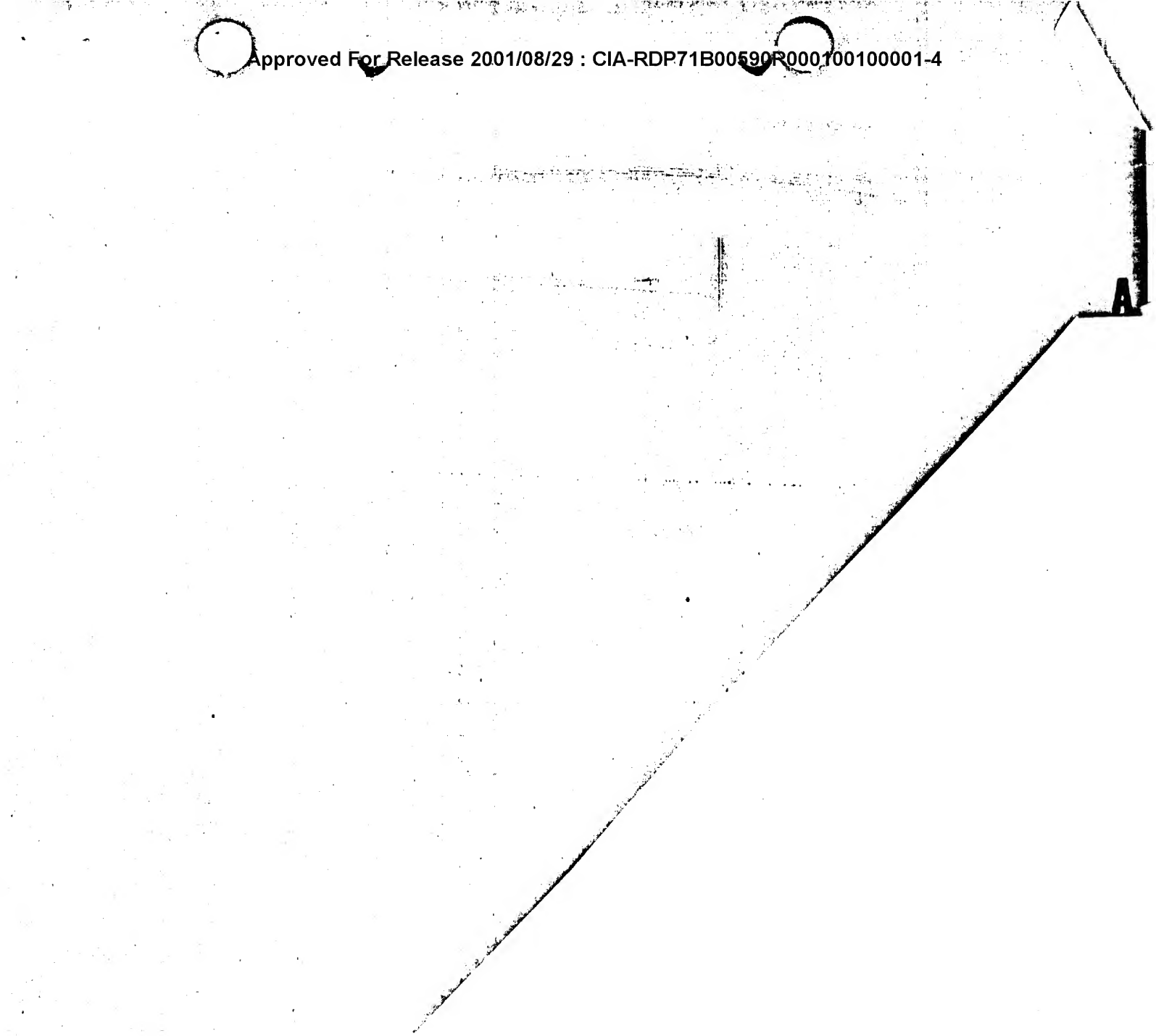
TAB LETTER		NOT APPLICABLE	APPLICABLE NOT ATTACHED	ATTACHED	NO. F... AT...
A	AF FORM 711			X	
B	~~AF FORM 711a~~	X			
C	AF FORM 711b			X	
D	AF FORM 711c			X	
E	~~AF FORM 711d~~	X			
F	~~AF FORM 711e~~	X			
G	~~AF FORM 711f~~	X			
H	AF FORM 711g			X	
I	UNSATISFACTORY REPORT	X			
J	TEARDOWN DEFICIENCY REPORT	X			
K	LIST OF TECHNICAL ORDERS NOT COMPLIED WITH			X	
L	AFTO FORMS 781 SERIES			X	
M	AF FORM 5			X	
N	STATEMENTS			X	
O	~~REBUTTALS~~	X			
P	ORDERS APPOINTING INVESTIGATING BOARD			X	
Q	BOARD PROCEEDINGS			X	
R	DD FORM 175 OR DD FORM 1080			X	
S	DD FORM 365 (Weight and Balance Clearance Form F)			X	
T	STATEMENT OF DAMAGE TO PRIVATE PROPERTY			X	
U	CERTIFICATE OF DAMAGE (List of Parts Damaged), MANHOURS REQUIRED TO REPAIR, AND COST			X	
V	TRANSCRIPTS OF RECORDED COMMUNICATIONS			X	
W	ANY ADDITIONAL SUBSTANTIATING DATA REPORTS			X	
X	~~OTHER AF FORMS (Failure and Consumption Reports, Etc.)~~	X			
Y	DIAGRAMS (Fall Out—Impact Area, Etc.)			X	
Z	PHOTOGRAPHS			X	

Whenever "Applicable but not attached" column is marked for any of the above items, information must be entered under remarks to indicate what action has been taken or will be taken to obtain the required attachment. Lettered tabs shown above will be inserted for corresponding attached items, i.e.; Tab N will always be used for Statements, Tab P for Orders Appointing Investigating Board, etc. Tabs will be omitted on those items not applicable.

REMARKS:

AF FORM DEC 62 711h

★ U.S. GOVERNMENT PRINTING OFFICE : 1962 OF—669564



AF Form 711 (Continued)

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A. HISTORY OF FLIGHT

25X1A

On Tuesday, January 25, 1966, Lockheed Aircraft Corporation Pilot [redacted] took off at 11:20 PST in SR-71 S/N 2003 for the purpose of a Category I Test. The aircraft was fueled to 136, 000 pounds gross weight and a center-of-gravity of 21.4%c̄. Take-off, climb and acceleration were normal. The Noah and Eli route was followed. During the first leg, prior to the IFR, everything was satisfactory with the following exceptions: the aircraft seemed to require excessive nose up trim in cruise, the Auto-Nav overshot its 35° bank limit to 40° in a left turn, and during the last two turns in this leg the pilot was required to hold back stick due to insufficient manual trim and while holding back stick noticed the stick pulsing in roll. In an attempt to reduce the nose-up trim requirements, the pilot used crossfeed for approximately five minutes. The pilot reported no effect upon C.G., but,based on fuel tank readings from the dictet, the C.G. actually moved forward approximately two percent, thus aggravating the up-trim condition during the rest of the cruise. The overshoot in bank angle and the stick nibble in roll, although undesirable, have been experienced frequently in other SR-71s. The overshoot in bank angle is due to slight mistrims in roll and the stick nibble is due to control system friction being nearly equal in magnitude to the low breakout forces in roll.

The descent to the tanker and the subsequent refueling was normal. The aircraft was refueled until 80,000 pounds of fuel was aboard. The gross weight and C.G. off the tanker was 137,000 pounds and 21.4%c̄, respectively. The acceleration toward Dalhart was uneventful until at approximately Mach 2.9 the aircraft, while in Auto-Nav, rolled into a 10 - 15° right bank. The pilot initially thought this to be an Auto-Nav malfunction. However, upon checking other instruments, he determined that the right forward bypass door had opened. He went to manual on the door and closed it. The Auto-Nav then rolled him back on course. The acceleration was continued to Mach 3.2. At 3.2, the pilot noticed the CIT limit of 400° was being exceeded and Mach number was reduced slightly. Just short of the Dalhart turn, fuel remaining was reported as 42,200 pounds, yielding a gross weight of approximately 100,000 pounds and a C.G. of 26.7%c based on the automatic fuel sequencing. In preparation for the turn at Dalhart, the engine fuel flow was boosted from 18000 - 19000 PPH to 21600 PPH to minimize the altitude loss in the turn. As the turn was initiated by the Auto-Nav, the pilot started to open the right hand door to provide an unstart margin. At this time, the conditions were approximately Mach 3.17 and [redacted] feet. In the 35° banked 25X1A
turn, an unstart on the right hand side was experienced which immediately rolled the aircraft up to 60° right bank. Pilot corrective action stopped the roll at 60° but seemed insufficient to roll the aircraft level. The pilot continued to apply additional roll correction without effect as well as a pitch down correction to reduce angle-of-attack. However, at this time, the nose started coming up rapidly with the pilot realizing he was in pitch up. The pilot indicated he recalled planning on staying with the ship as long as possible and made no conscious effort to eject. The pilot blacked out. He regained total consciousness while falling but was unable to see because his visor was iced up. When his main chute opened, he raised his visor and saw [redacted] about one-fourth of a mile 25X1A
away, descending in his chute and the aircraft burning about five miles away. The pilot suffered minor bruises and a minor cut on the bridge of his nose. The RSO was dead of a broken neck.

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AF Form 711 (Continued)

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B. INVESTIGATION AND ANALYSIS

The wreck was strewn over an area approximately 16 miles long and five miles wide near Mosquero, New Mexico. The main portion of the vehicle, the complete wing and fuselage aft of Fuselage Station 550, landed upright furtherest east. The forebody forward of Fuselage Station 550 landed inverted approximately eight miles west of the main body.

Examination of the wreck revealed the following pertinent items:

1. The front seat was still in the forebody. Seat belt and shoulder harness broken.
2. The rear seat had been ejected.
3. Both canopies had ejected.
4. CITs were 365° and 372°.
5. EGTs were: LH - 808°, RH - 838°.
6. Hydro system pressures were 3150, 3200, 3150 and 3500 psi.
7. Spikes auto.
8. Fuel 38,100 lbs.
9. TDI altitudes 77,450, 77,600 feet.
10. TDI Mach 0.37, 2.51.
11. TDI KEAS 36
12. TDI TAS 1716
13. Angle-of-attack 15.5°
14. Pitch trim actuator 2.8° T.E. up.
15. The forebody broke in the upward direction.
16. The Dictet was intact.
17. The EMR recorder was intact.
18. The right engine threw blades through the nacelle.

The dictet tape verified many of the items discussed previously which had been taken primarily from the pilot's debriefing. However, one discrepancy was that the dictet indicated the last pitch trim reading immediately prior to the accident was 4.5° T.E. up. This must be discounted as being in error on the following basis: In pilot debriefing, he recalled 2.5° T.E. up. The trim actuator indicated 2.8° T.E. up upon loss of power. Pitch trim prior to reaching Mach 3.0 from the dictet indicated 3.0° T.E. up. Increasing Mach number would reduce the required trim angle unless the C.G. had moved forward by an appreciable amount. 2.5° T.E. up trim matches the predicted trim requirements for the flight conditions.

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Structural analysis of the wreck indicated the lower longeron of the forebody failed in tension whereas the upper longeron failed in compression.

The forebody, once it broke loose, was aft end into the wind, the internal chine area became pressurized to +5 psi in a fraction of a second. This pressure is sufficient to blow off the chine panels in the area of the external canopy jettison handle and thus rip the handle loose. Inspection indicated the chine panels to have failed in this direction as well as having ripped the handle loose. Evidence showed that both canopies, as a result, jettisoned. The high negative load factors, in conjunction with the onset rate with the added possibility of deployment of the drogue chute, literally ripped the pilot out of the forebody. Wind blast on the seat belt which accompanied the pilot after being torn from the seat actuated the automatic sequencing of the chute system. The same loads were applied to the RSO; however, the rear seat had been fired. Evidence showed the "T" handle to have been pulled, but by what force cannot be positively stated. If the ejection occurred at the time of peak positive g's, a load in excess of 30 g's would have been applied while the RSO was in a head down position.

After the forebody broke away, the aft section of the vehicle would have been stable and would have fallen away from the forebody. However, the rapid tumbling of the forebody would have precluded any large vertical separation and sufficient contact could have been made to knock the aft tailcone off the fuselage. The final motion of the aft body once it had slowed to subsonic speeds would be a flat spin as evidenced by witness reports and inspection of the impact area.

The condition of the right engine, melted blades, holes in the nacelle, etc., are attributed to over-temperature of the engine after breakup of the vehicle, since the EGTs were normal upon loss of power.

The above information is derived from evidence available from the wreck, pilot comments in debriefing, dictet notes and witness reports, and, in large part, except for the initial summary of the flight, deal with the results of the accident rather than the cause. Analysis of the pertinent data available from the EMR recorder,in conjunction with a knowledge of the flight conditions,yields an insight into the sequence of events leading up to loss of control of the aircraft.

The pitch stability of the aircraft at the reported flight conditions and at the C.G. verified by the reported trim elevon angle requirement, would be as follows: The basic vehicle without stability augmentation would be neutrally stable in 1 "g" level flight and would become unstable at load factors above 1 "g". The instability becomes progressively worse with increasing load factor. However, the pitch stability autmentation system provides an apparent increase in stability. This increase in stability would have precluded a divergency in pitch (pitch-up) even under the aft C.G. condition that existed providing that the load factor did not exceed 1.6 g's. In addition, the SAS would have substantially slowed the divergence until its authority limit was reached at 2.5 g's; however, the SAS would not have stopped the divergence once 7.5° angle-of-attack had been exceeded. The pertinent data obtained from the EMR provides pitch attitude, roll attitude, time, heading and altitude. Analysis of this data and, in particular, comparison of the data during the last turn relative to earlier turns during the flight show the following: During the

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early turns, pitch attitude varied by, at most, 1°; whereas, during the last turn, pitch attitude showed a continual buildup during the roll into the turn as far as the data was available. It seems apparent from the data that the pilot flying the aircraft in the pitch axis instinctively pulled the nose up as he rolled into the turn. The pitch rate at this time is so insidious, it may easily escape the pilot's attention. With the unstart occurring at approximately the same time as the SAS runs out of authority, loss of pitch control became a certainty.

A series of tests were conducted on 1 and 2 February 1966 using the SR-71 Flight Simulator at Beale AFB. The purpose of these tests was an attempt to duplicate the aircraft and flight conditions which existed at the time of the accident and the maneuvers which resulted in loss of control in order to determine the reason for loss of control and whether or not it could have been prevented.

25X1A [redacted]

25X1A Test conditions were as follows: Aircraft gross weight 100,000 pounds; speed 3.15 Mach; altitude [redacted] feet; 35° right bank in a shallow climb; right forward inlet bypass doors set manually to match the left CIP. Each pilot flew one test at 25% CG, 26% CG and 27% CG. After initial conditions were established, the right inlet was unstarted and the pilot attempted to recover the aircraft from the ensuing maneuvers. Data from the tests was recorded and can be seen in a separate report in Tab W. In general, the results of the tests showed that, at 25% CG, little difficulty was encountered in recovering the aircraft; at 26% CG, recovery was marginal; and, at 27% CG, recovery either could not be effected or, if a momentary recovery was effected, the aircraft was lost immediately when the pilot's attention was diverted momentarily from the task of maintaining pitch control.

25X1A [redacted] stated that the simulator test at 27% CG appeared to duplicate very closely the maneuvers which resulted in his loss of control in the actual aircraft.

Further tests were conducted at the 27% CG condition with the following results: (1) With zero pitch rate, an angle-of-attack of 10 1/2° could be maintained with full forward stick. (2) Above 10 1/2° angle-of-attack, a zero pitch rate could not be maintained with full forward stick and the angle-of-attack continued to insrease. (3) With a pitch rate of less than 1° per second, the aircraft would continue to putch up, out of control, if full forward stick was applied after 7 1/2° angle-of-attack had been exceeded (NOTE: At these flight conditions, the angle-of-attack was 4 1/2° for level flight and 6° in a 35° bank). (4) Pitch rates in excess of 1° per second resulted in immediate loss of control. (5) By giving maximum attention to the angle-of-attack and pitch attitude, the aircraft could be controlled; however, a momentary distraction from these instruments resulted in loss of control. (6) Pitch rates and angles-of-attack,which would cause loss of control, were so small that they were not readily apparent to the pilot during a normal instrument cross-check. Additional tests were conducted with the pitch stability augmentation system failed and, although the aircraft was more difficult to control, the results at each CG were essentially the same.

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The general opinion of the pilots participating in these tests was that the Simulator accurately depicts the aircraft handling qualities and flight characteristics in all areas except roll response. The roll response to a roll command was felt to be too high. However, they were unanimous in their opinion that this did not affect the validity of the tests. The SR-71 Flight Simulator employs two Mark I digital computers for continuous solving of flight, propulsion, navigation, communication and accessory equations to achieve as close a simulator-to-aircraft performance relationship as possible. The Mark I computer receives analog and Boolean inputs from the cockpit controls and switches, converts the analog inputs to digital form, performs the reauired computations, and converts the results into analog signals. These signals control the Simulator to provide realistic response in accordance with the aircraft's performance characteristics. The cockpit controls, switches and displays are exact duplicates of the aircraft. A motion system imparts a realistic sensation of flight maneuvers.

One final conclusion based upon the evidence available is that the pressure suit provides excellent protection for the man ejecting at high Mach numbers and altitudes.

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AF Form 711 (Continued)

C. FINDINGS

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1. Primary Cause: The primary cause of this accident was a miscellaneous unsafe conditon in that the aircraft was flown into a statically unstable regime in which a disturbance in the pitch axis resulted in development of a pitch rate which could not be controlled.

2. Additional Findings:

a. There is no accurate and direct means to show the pilot CG location, nor are there provisions for manually moving fuel rapidly aft, as well as forward, to set a desired CG for various flight conditions.

b. There is no standardization/evaluation program in effect for Lockheed California Company ADP pilots, nor are adequate records of flying activity and training being maintained.

c. The pilot and RSO operated the aircraft in accordance with Flight Manual procedures and the test plan from time of entering the cockpit until the aircraft became uncontrollable.

d. The aircraft fuel system was not programming as desired during the first phase of the flight. Subsequent to aerial refueling, it appears that it was programming in accordance with the preset schedule.

e. The aircraft entered a turn using an Auto-Nav programmed 35° bank at 3.15 Mach and 77,842 feet altitude. CG was approximately 26.7% which is aft of the authorized aft limit of 26.5% for supersonic flight. The right engine unstarted shortly after the turn. The right inlet unstarted from an undetermined cause.

f. The aircraft did not respond to aileron forces to correct the bank nor did it respond to forward stick forces to lower the pitch attitude and decrease angle-of-attack. A pitch rate was developed, the aircraft pitched-up and began to disintegrate due to forces beyond the design criteria.

g. The structural breakup at fuselage station 535 is a result of exceeding structural design limits due to aircraft longitudinal instability in pitch-up and is a secondary failure.

h. The engines were operating in mid-afterburner range at the time of the accident and did not contribute to the accident; however, pilot distraction, caused by manual operation of the right forward inlet doors and subsequent unstart, could have contributed to the loss of control.

i. DD Form 365F is not used nor is there an equivalent form in use for recording weight and balance data. A form titled: "R-12 Flight Loading Sheet", is used to record loading of all serviced items with resulting gross weight and CG. The form does not provide cross-check procedure for fuel loading to assure deisred loading and distribution in the aircraft.

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AF Form 711 (Continued)

j. The Flight Control System did not malfunction nor did it contribute to this accident.

k. Maintenance factors and non-compliance with Service Bulletins did not contribute to this accident.

l. The pilot's lap belt sheared bilaterally in the area of adjustment.

m. The injuries that the RSO sustained indicate that he had undergone a high rate of spin.

n. One of the oxygen hoses on the pilot's suit was broken off at the solder joint. The solder joint on the other hose was severely weakened and separated while being leak-checked.

o. The pilot's face plate iced over during the free fall thus obscuring vision.

p. Sublexation of the RSO's skull on the first cervical vertebrae which is felt to be due to anterior-posterior forces in which the neck was immobilized and the head was allowed to move.

q. It is felt that the pilot's lap belt sheared at a force less than specified in the military specifications due to the sharp edges on the knurled adjustment.

r. Neither the pilot nor the RSO initiated the ejection sequence.

D. RECOMMENDATIONS:

1. Aircraft CG, speed and altitude limitations should be changed to provide a greater safety margin until proper flight parameters, procedures and equipment are studied and necessary changes made to provide a safe operating envelope.

2. An accurate, direct reading CG indicating system should be installed in both cockpits to show the crew exact CG location.

3. The fuel system should be modified to allow rapid aft, as well as forward, movement of fuel in order to establish optimum CG for the flight conditions.

4. A standardization/evaluation program should be established for Lockheed ADP pilots and crew members, and adequate records of flying and training maintained.

5. Fuel system scheduling be revised to maintain aircraft CG limits during Mach 3+ flight.

6. Automatic inlet control reliability be improved.

7. The R-12 Flight Loading Sheet should be revised to provide cross-check procedures for fuel loading to assure that the desired fuel quantity is loaded and distributed properly. The revised form should also provide for computation and recording of necessary weight and balance data. DD Form 365F should be used.

AF Form 711 (Continued)

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8. LAC review their aircraft records on DD Forms 829 and 829-1, reference Spike Assembly, to insure that the data recorded is correct and current.

9. The Project Support Office and the Engine Manufacturer conduct a study to provide more accurate configuration control of all engines.

10. Redesign the knurled roller bar on the lap belt adjustment to eliminate the sharp edges on each end.

11. Remove the stabilization chute from the man and utilize a stabilized seat as soon as possible.

12. Remove the oxygen hoses from the front of the existing suits as soon as possible. Modify them to a more modern configuration.

13. Provide bailout face plate heat.

14. A study should be made to determine the feasibility of an automatic ejection system under high altitude breakup conditions.

15. A means be developed immediately to insure that all crew members can reach the headrest regardless of torso height.

16. The lap belt should be inspected prior to each flight for general condition.

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USAF ACCIDENT/INCIDENT REPORT

(Fill in all spaces applicable. If additional space is needed, use additional sheet(s).)

1. DATE OF OCCURRENCE (Year, month and day)	2. VEHICLE(S)/MATERIEL INVOLVED (TMS & Serial Nr., if applicable)	3. FOR GROUND ACCIDENTS ONLY (Base Code and Report Serial Nr.)
1966, Jan, 25, Tuesday	SR-71, SN 61-7952 (#2003)	N/A

4. PLACE OF OCCURRENCE: STATE, COUNTY, DISTANCE AND DIRECTION FROM NEAREST TOWN. IF ON BASE, IDENTIFY. IF OFF BASE GIVE DISTANCE FROM NEAREST BASE. *	5. HOUR AND TIME ZONE LOCAL	6.
New Mexico, Harding, 107 mi, 350° True, Cannon AFB	1432 MST	[X] DAY [ ] NIGHT [ ] DAWN [ ] DUSK

7. ORGANIZATION POSSESSING OWNING VEHICLE OR MATERIEL AT TIME OF MISHAP

Major Command	Subcommand or AF	Air Division	Wing	Group	Squadron or Unit	Name and Base Code
AFSC	#ASD(ASZB)	-	-	-	-	Wright-Pat. AFB

8. *(List organizations of second vehicle, if they differ from Item 7 above)*

9. BASE AND COMMAND SUBMITTING REPORT *(Do not Abbreviate)*

Directorate of Aerospace Safety, Norton Air Force Base, California

10. **LIST OF PERSONNEL DIRECTLY INVOLVED**

(For aircraft include operator and all other persons whether in plane or not. If more space is required to list all personnel, use additional sheet(s).)

Last Name	First Name	M.I.	Grade	Service No.	Assigned Duty	Aero Rating	Injury to Individual
[redacted]			Civ	-	Pilot	-	Minor
			Civ	-	RSO	-	Fatal

25X1A

11. NARRATIVE DESCRIPTION OF ACCIDENT: Give a detailed history of flight, or chronological order of facts and circumstances leading to the mishap as applicable, the results of investigation and analysis to include discussion of all cause factors listed, findings, and recommendations, and any corrective action taken. *(Continue on reverse, if more space needed.)*

SEE ATTACHED PAGES FOR:

A. History of Flight
B. Investigation and Analysis
C. Findings
D. Recommendations

Individual Group reports are in Tab "W"

* Main Wreckage - 174° True, 7.1 sm from Bueyeros, New Mexico
Nose Section - 228° True, 6.9 sm from Bueyeros, New Mexico

#AIRCRAFT BAILED TO LOCKHEED-CALIFORNIA COMPANY

12. **AUTHENTICATION**

CERTIFICATION BY (Title)	TYPED NAME AND GRADE	SIGNATURE	DATE
RECORDER	Donald R. James	Donald R. James	2 Feb 66

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* U.S. GOVERNMENT PRINTING OFFICE : 1966 O—696867

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The foregoing findings and recommendations were approved by the following members of the accident board coordinating group.

JAMES G FUSSELL
Colonel, USAF
Board President

HORACE A TEMPLETON
Colonel, USAF
Special Advisor

IAN D ROTHWELL
Lt Col, USAF
Investigating Officer

WALTER F DANIEL
Lt Col, USAF
Pilot Member

RAY C GORDON, JR
Lt Col, USAF
Material Factors

ROBERT E MATEJKA
Major, USAF
Flight Surgeon

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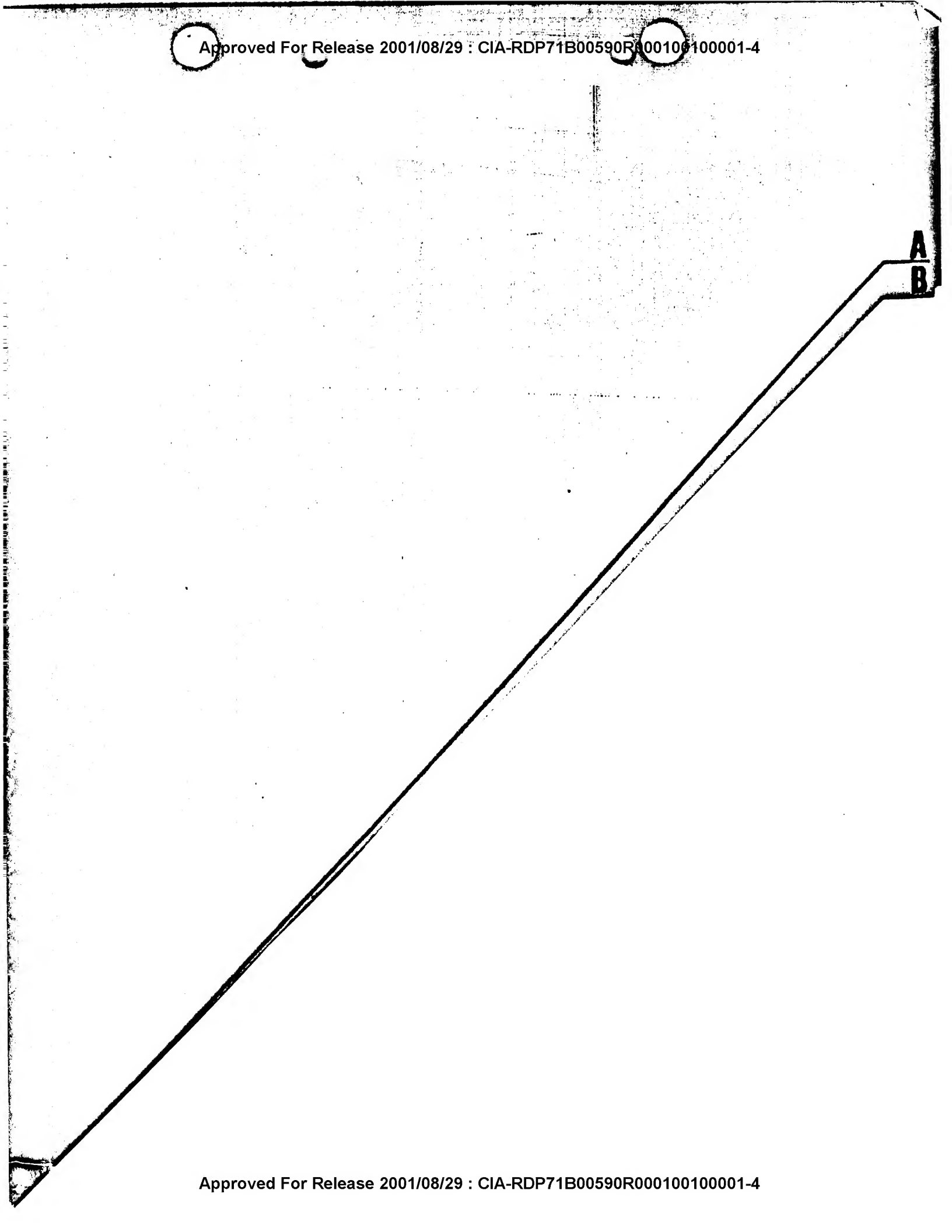

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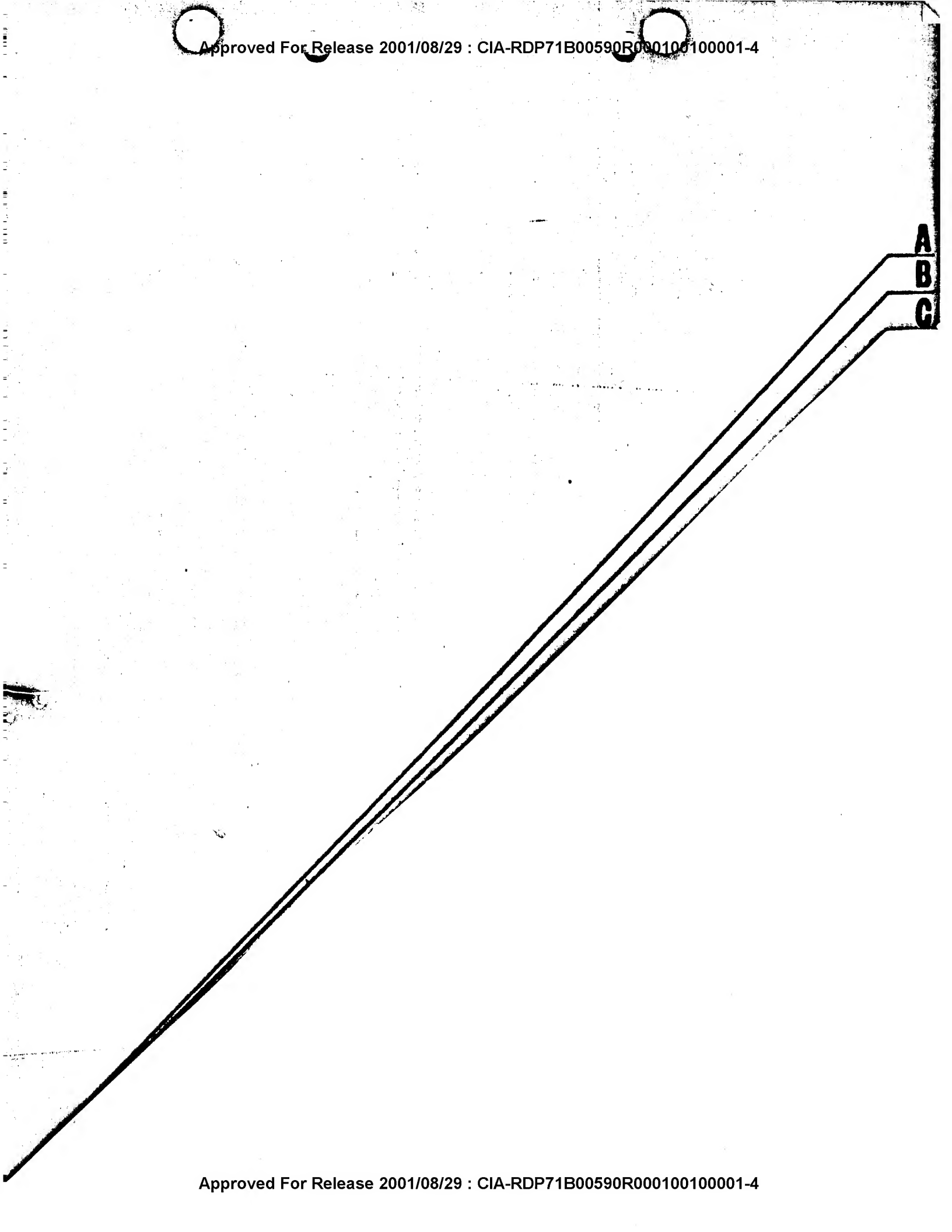

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AIRCRAFT ACCIDENT/INCIDENT REPORT

To be filled out for principal aircraft involved. *(Appropriate blocks only should be filled out on secondary aircraft.)*

1. ACCIDENT/INCIDENT CLASSIFICATION *(Check one)*

Flight Accident Resulting in Aircraft Damage	[X]	Accident Not Resulting in Aircraft Damage	[ ]
Aircraft Non-flight Accident	[ ]	Air Force Aircraft Incident	[ ]

2. Aircraft/Serial Number	3. Type, Model, Series, Block No.	4. Assignment/Status Code (AFM 65-110)
61-7952	SR-71 #2003	EB

5. If aircraft was being ferried or delivered indicate gaining and losing organizations, date of transfer, ultimate destination.

Not applicable.

6. CLEARANCE: From Edwards AFB | To Edwards AFB | To Round-robin flight

7. Filed: VFR ____ VFR—ON TOP ____ IFR X Local ____ Other ____ Direct ____ Airways ____ (Controlled) ____

8. Flight reference at time of accident	9. Duration of Flight		10. Mission of flight
Contact X Instrument Actual ____ Sim. ____ Other ____ Unk. ____	Hrs. 2	Mins. 12	Category I sensor test.

11. ALTITUDE DATA	Cleared Alt. MSL	Altitude above terrain acdt sequence began	Altitude MSL impact point	Highest altitude MSL flown	Time flown above 74,000 feet
	Above FL600 Ft.	77,482 Ft.	4680 Ft.	82,685 Ft.	Hrs. ____ Min. 27.55"

12. Fire and explosion data

a. Fire: None ____ Inflight ____ Ground X
Result of grd. impact? Yes X No ____

b. Explosion: None X Inflight ____ Ground ____
Result of grd. impact? Yes ____ No ____

13. Airfield data: Applicable to takeoff and landing accidents occurring within 2 miles of airfield

Field elevation in use ____ Ft. | Composition of rnwy. Asphalt ____ Concrete ____
Length of runway in use ____ Ft. | Other *(Specify)* ____
Length of overrun ____ Ft. | Composition of overrun *(Specify)* ____
Distance of touchdown from runway ____ Ft. | Surface condition. Dry ____ Wet ____ Icy ____
Heading of runway ____ ° | Other *(Specify)* ____

Conditions affecting occurrence; e.g., type of instrument or lighting approach aid used, obstructions, barrier, airspeed, gross weight, forced landing

14. *(If answer is "Yes," to either question, discuss under item 11, AF Form 711)*
Violations [ ] Yes [X] No Breaches of air discipline [ ] Yes [X] No

15. PHASE OF OPERATION: e.g. take off roll, initial climb, normal flight, acrobatics, landing approach, flareout	16. TYPE OF ACCIDENT: e.g. gear-up landing, mid-air collision, abandoned aircraft, fire or explosion in flight, undershoot, overshoot
Supersonic cruise at design speed.	Airframe failure inflight.

17. WEATHER AT TIME AND PLACE OF ACCIDENT: *(If a factor in the accident, attach statement of weather officer)* 1357MST, Tucumcari, N.M.

Sky conditions	Visibility	Wind direction and velocity	Temperature	Dew point	Alt. setting	Other weather conditions
Clear	20	070/11	29°F	18°F	30.06	None

PILOT(S) INVOLVED (FLIGHT CREW)

18. OPERATOR *(Person at controls at time of accident)*

[redacted]

a. POSITION IN AIRCRAFT AT TIME OF ACCIDENT: Front ~~or Left~~ Seat X Rear or Right Seat ____
c. ASSIGNED DUTY ON FLIGHT ORDER: AC ____ IP ____ P X CP ____ Other *(Specify)* ____ 25X1A

d. ASSIGNED ORGANIZATION: Major Command	Subcommand or AF	Air Division	Wing	Group	Squadron or Unit	Base
LOCKHEED CALIFORNIA	COMPANY					Burbank, Calif.

e. ATTACHED ORGANIZATION FOR FLYING: Major Command	Subcommand or AF	Air Division	Wing	Group	Squadron or Unit	Base
ADVANCED DEVELOPMENT	PROJECT (LAC-ADP)					Burbank, Calif.

f. ORIGINAL AERONAUTICAL RATING AND DATE RECEIVED	g. PRESENT AERONAUTICAL RATING AND DATE RECEIVED	h. INSTRUMENT CARD	i. AFSC
Pilot July 1952	FAA-ATR March 1961	Type ATR Date of expiration Indefinite	Primary ____ Duty ____

19. OTHER PILOT

a. LAST NAME *(Jr., II, etc.)* FIRST NAME MIDDLE NAME	GRADE	COMPONENT	SERVICE NUMBER	NATIONALITY	YR. OF BIRTH

b. POSITION IN AIRCRAFT AT TIME OF ACCIDENT: Front or Left Seat ____ Rear or Right Seat ____ Other ____
c. ASSIGNED DUTY ON FLIGHT ORDER: AC ____ IP ____ P ____ CP ____ Other *(Specify)* ____

d. ASSIGNED ORGANIZATION: Major Command	Subcommand or AF	Air Division	Wing	Group	Squadron or Unit	Base

e. ATTACHED ORGANIZATION FOR FLYING: Major Command	Subcommand or AF	Air Division	Wing	Group	Squadron or Unit	Base

f. ORIGINAL AERONAUTICAL RATING	g. PRESENT AERONAUTICAL RATING	h. INSTRUMENT CARD	i. AFSC
		Type ____ Date of expiration ____	Primary ____ Duty ____

NOTE: IF MORE THAN TWO PILOTS ARE INVOLVED (FLIGHT CREW) REPORT SAME INFORMATION REQUIRED ON ADDITIONAL SHEET FOR EACH.

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20. FLYING EXPERIENCE *(Attach copy of AF Form 5 for Pilot(s) involved as outlined in AFR 127-4.)*

ASSIGNED DUTY ON FLIGHT ORDERS: *(Give last names only. List all flight times to nearest hour.)*	Pilot	Co-Pilot	Inst. Pilot	Acft. Cmdr.	Student Pilot
	[redacted]	25X1A			
a. Total flying hours *(Including AF time, student and other accredited time):*	3,577:25				
b. Total Jet Time:	2,412:10				
c. Total 1st Pilot/IP hours, all Aircraft:	2,868:20				
d. Total Weather Instrument Hours:	No record				
e. Total 1st Pilot/IP hours this Model:	70:30				
f. Total 1st Pilot/IP hours last 90 Days:	24:10				
g. Total 1st Pilot/IP hours last 90 Days this Model:	23:05				
h. Total 1st Pilot/IP hours weather and hood last 90 Days:	No record				
i. Total Pilot hours night last 90 Days:	None				
j. Total Pilot hours last 30 Days:					
k. Total 1st Pilot/IP hours last 30 Days:	4:25				
l. Total 1st Pilot/IP hours last 30 Days this Model:	4:25				
m. Date and Duration last previous flight this Model:	19 Jan 66 1:15				
n. Date of last proficiency flight check:	No record				

21. CAUSATIVE AGENCY

Cause Factors *(Check one primary and all applicable contributing and probable factors.)*

	Primary	Contributing	Probable
Operators			
Pilot			
Co-Pilot			
Controller (Drones)			
Crewmembers *(Other than Operator)*			
(Specify)			
Supervisory Personnel			
(Specify)			
Maintenance Personnel			
Type of pers. and orgn. level			
Other Personnel			
(Specify)			
Materiel Failure or Malfunction			
Engines			
Airframe			
Landing Gear			
Other *(Specify)*			
Airbase or Airways			
Weather			
Misc. Unsafe Conditions			
(Specify) Loss of control in statically unstable regime	X		
Undetermined ☐			

22. DAMAGE

Damage to Aircraft	Damage Beyond Economical Repair	Manhours to Repair	Cost *(Est.)*
☒ Destroyed ☐ Minor ☐ Substantial ☐ None	☒ Yes ☐ No	NA	$ [redacted]

Description of Damage *(Describe briefly extent of damage to aircraft and any property damage incurred)*

Aircraft totally destroyed (See Tab U)

25X1A

Damage to private property (See Tab T)

23. AUTHENTICATION *(Signature and grade)*

President: James G. Fussell, Colonel, USAF	Accident Investigation Officer: Jack D. Rothwell, Lt Col, USAF
Maintenance Officer: Ray C. Gordon, Jr, Lt Col, USAF	Medical Officer: Robert E. Matejka, Major, USAF
AACS Representative: NA	AWS Representative: NA
Member: Walter F. Daniel, Lt Col, USAF	Recorder: Donald R. James, Major, USAF

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AF FORM DEC 62 711b

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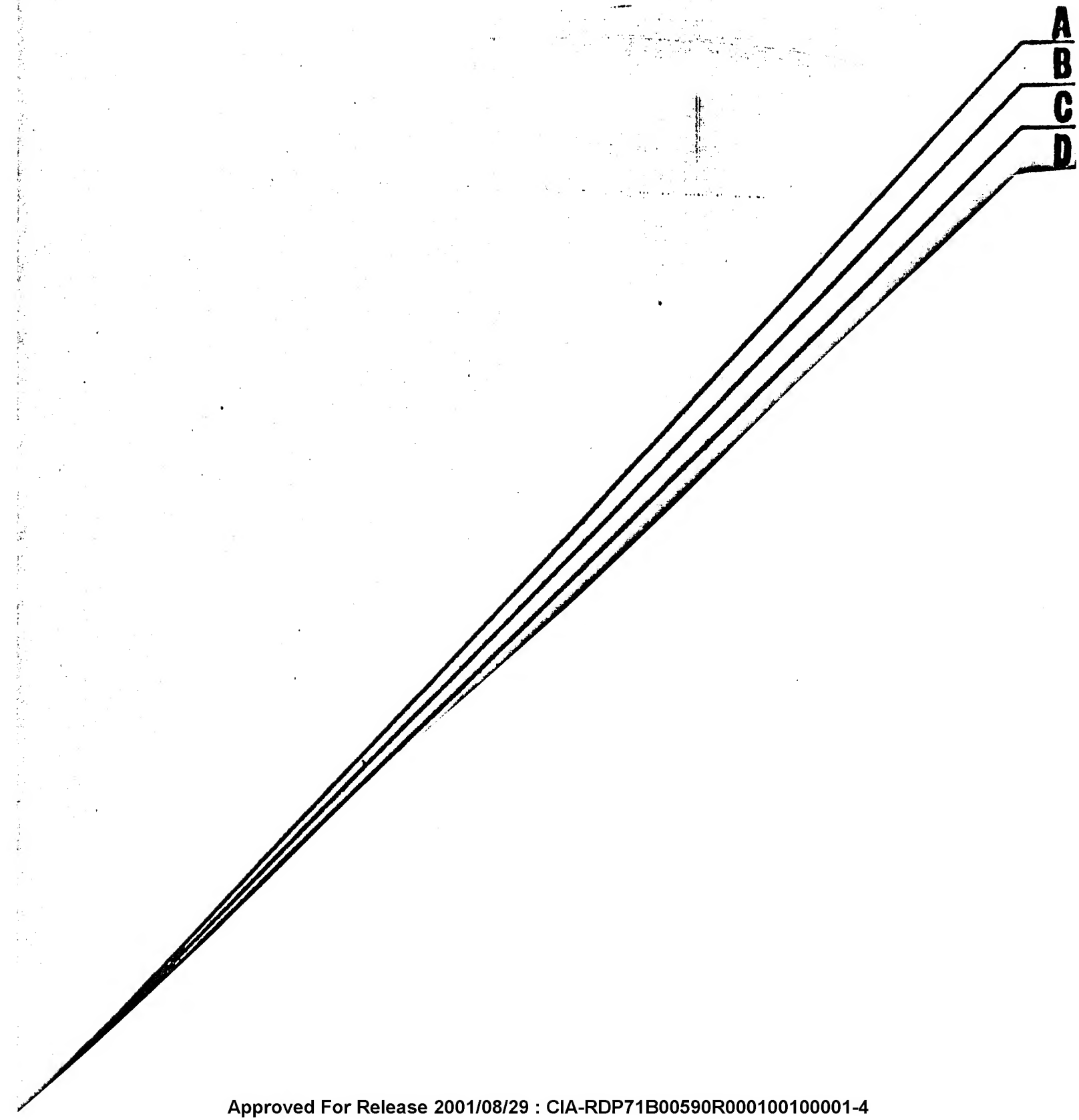

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AIRCRAFT MAINTENANCE/MATERIEL REPORT

Use this form when AF aircraft accident/incident involves inadequacy, malfunction or failure of AF materiel.

1. AIRCRAFT TM & SERIAL NUMBER	2. SPECIAL REPORTS DATA	
SR-71 61-7952	a. Were Previous UR's Submitted on Factor(s) Involved? ☐ Yes ☒ No	b. No. and Date of UR's Submitted as Result of This Accident (Attach copy) See Life Sciences Report
	c. Is TDR Requested? ☐ Yes ☒ No	d. No. of T.O.'s Not Complied With at Time of Accident (List T.O. Nos. and titles on separate sheet(s)—Tab K) Aircraft (91) Engine #1 (24) Engine #2 (25) Total (140)

3. AIRCRAFT HISTORICAL DATA

Item	Aircraft	Part, Component or Accessory
Identification of Aircraft/Part, etc.	SR-71 952	Aircraft General
Air Force Acceptance Date	17 Feb 1965	
Total Flight Hours	79:28	
Last Overhaul Date	New	
Overhauling Activity (Name and location)	N/A	
Hours Since Overhaul	N/A	
Hours Since Last Periodic Inspection	9:39	
Date of Last Periodic Inspection	30 Dec 1965	
Type of Last Periodic Inspection	1st Periodic	

4. ENGINE HISTORICAL DATA

(Complete a separate column for each engine involved. Also, complete a separate column for each power plant component involved.)

Installed Position	Number 1	Number 2		
Engine Model and Series	JT11D-20	JT11D-20		
Engine Serial Number	P648336	P648333		
Total Engine Hours	43:49	62:19	Flight + Ground time	
Number of Major Overhauls	New	New		
Hours Since Last Major Overhaul	New	New		
Date of Last Overhaul	23 Oct 1965	16 Sep 1965	Acceptance	
Overhaul Activity	P & W	P & W		
Date Last Installed	17 Nov 1965	17 Nov 1965		
Hours Since Last Installed	42:21	44:26	Flight + Ground time	
Date of Last Periodic Inspection	New	New		
Type of Last Periodic Inspection	New	New		
Fuel (Type and octane rating)	P&W 523	P&W 523		

5. FIRE DATA

(To be completed when fire or chemical explosion occurs, not resulting from ground impact. Indicate: P—Probable or K—Known, in squares below.)

a. MATERIEL FAILURE CAUSING THE FIRE				b. IGNITION SOURCE				c. COMBUSTIBLE MATERIAL			
Electrical System	NA	Propulsion System	NA	Electrical System	NA	Static Electricity/ Lightning	NA	Cargo	NA	Hydraulic Fluid	NA
Fuel System	NA	Other (Specify)	NA	Pneumatic System	NA	Other (Specify)	NA	Electrical Insulation	NA	Lubricating Oil	NA
Hydraulic System	NA		NA	Propulsion System	NA		NA	Explosives	NA	Other (Specify)	NA
Pneumatic System	NA	Unknown	NA		NA	Unknown	NA	Fuel	NA	Unknown	NA

d. AIRCRAFT FIRE EXTINGUISHING SYSTEM						e. FIRE/OVERHEAT WARNING		
	Fixed	Portable		Fixed	Portable		Fire Detector	Overheat Indicator
Extinguished Fire	NA		Not Activated and Not Near Fire	NA		Operated Properly	NA	
Reduced Fire	NA		If Discharged, Chemical Used	NA		Not Operated, but Near Fire	NA	
No Effect When Discharged	NA		If Discharged, Amount of Chemical Used	NA		Not Operated and Not Near Fire	NA	
Activated but Did Not Discharge	NA		Other Pertinent Info.	NA		Not Installed	NA	
Not Activated but Near Fire	NA			NA		Other (Specify)	NA	

f.	SHUT OFF PROCEDURE	RESULTS OF ALLOWING FIRE TO BURN OUT	g. EFFECT OF FIRE	MARK ONE
Extinguished Fire	NA	NA	Catastrophic	NA
Reduced Fire	NA	NA	Increased Severity of Mishap	NA
No Effect	NA	NA	No Change in Severity of Mishap	NA
Not Accomplished	NA	NA	Unknown	NA
Unknown	NA	NA		

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6. LOCATION OF INITIAL FIRE

	Known	Probable		Known	Probable		Known	Probable
Baggage Compartment	NA		Aft of Firewall	NA		Wheel Well	NA	
Bomb Bay	NA		Forward of Firewall	NA		Cargo-Passenger Compartment	NA	
Cockpit/Crew Quarters	NA		Rocket Pod	NA		Other (Specify)	NA	
Engine Section	NA		Tire/Wheel/Brake	NA		Unknown ☐		

7. MISCELLANEOUS CHEMICAL EXPLOSION DATA

	Known	Probable		Known	Probable
Initial Ignition Occurred in an Explosive Manner Prior to Ground Impact.	NA		Intensity of Explosion Was Sufficient To Cause or Appreciably Contribute to In-Flight Airframe Break-Up.	NA	
Explosion Occurred After Fire and Before Ground Impact.	NA		Other Significant Data (Specify)	NA	
Explosion Occurred Subsequent to Ground Impact.	NA		Unknown or Not Available.	NA	

8. AIRCRAFT MAINTENANCE OFFICER'S ANALYSIS AND SPECIFIC ACTION TAKEN

Describe difficulties involved and relationship of the various components to the accident. Describe specific action taken. For Fire Data describe the fire and/or chemical explosion. Cover in detail any noted deficiencies, malfunctions of fire detecting and extinguishing equipment, or questionable procedures. When discussing specific equipment, give the name of manufacturer, part numbers, etc., and state whether or not a UR has been submitted. Include any additional information or opinion of possible value to future technical analysis of this report.

On 25 January 1966, SR-71, 61-7952, was airborne from Edwards Air Force Base, California at 1120 hours, Pacific Standard Time, on a Category I research and development test flight. The aircraft was airborne approximately two (2) hous twelve (12) minutes and the pilot had completed the first half of the scheduled mission and had accomplished one (1) aerial refueling. No mechanical difficulties had been encountered. At approximately 1330 hours, Pacific Standard Time, a right turn was started for turn around to Edwards AFB, California when an unstart occurred on the right engine. This condition started the aircraft rolling to the right. The pilot moved controls to counteract this rolling, but a nose up movement developed and the aircraft became uncontrollable.

The aircraft nose section broke off at approximately station 535 and landed about ten (10) miles from the rest of the aircraft. The large section; wings, fuselage, etc; came down in a flat spin. Fire damage was caused by ground impact. Parts were scattered over an area approximately fifteen (15) miles in length and ten (10) miles in width. All major components were transported to Edwards AFB for analysis except the aircraft drag chute and the tape from the Mission Recorder. These could not be found.

The aircraft records were impounded and reviewed.

There were no overdue time change items. All documented maintenance actions were signed off properly. In all cases a mechanic and an inspector signed off each discrepancy and the removal and replacement of all items. In reviewing documentation on aircraft maintenance records from October 1965 to current forms for flight number 41, 25 January 1966, one discrepancy was noted: One open write up in AFTO Form 781b that ballast is installed in EMR and SLR compartments was in error. Load sheet and wreckage shows that sensors were aboard and not ballast.

In reviewing DD Forms 829-1 the following discrepancies were found:

1. Engine DD Form 829s indicate that proper documentation did not arrive with the engine from the factory. Examples: Engine P648336 indicates fifteen (15) service bulletins complied with, however, service bulletin application says they are not applicable to this serial numbered engine. The engine DD Form 829s do not show previously complied with service bulletins. They only show the service bulletins complied with at Edwards AFB Engine Shop.

2. Spike assembly DD Form 829s did not have a part number on it and the DD Form 829-1 was not attached, therefore, it is impossible to tell from the records what service bulletins apply to this aircraft.

There were 140 outstanding service bulletins on the aircraft and engines:

Aircraft and Associate Equipment	91
Engine Serial Number P648336	24
Engine Serial Number P648333	25

Service Bulletin R-212, Inlet Control Wiring Revision, was partially complied with on the left engine, but not on the right. Accomplishment of service bulletins R-104, R-212, R-221 and R-269 will decrease the amount of unstarts, but will not eliminate them.

Service Bulletin R-300, Substitution of Shear Bolts at FS 535 would not have prevented break-up. The subject bolts are at the top of the fuselage but the aircraft started breaking up at the bottom of the fuselage.

These open service bulletins did not contribute to the primary cause of the accident.

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RECOMMENDATION:

1. Project Support Office and engine manufacture conduct a study to provide more accurate configuration control of all engines.

2. LAC re-evaluate Service Bulletin 300, Substitution of Shear Bolts at FS 535 with reference to the bottom longeron.

3. LAC review their aircraft records for proper information on DD Forms 829 and 829-1 on Spike Assembly.

Gordon L. Scharnhorst

GORDON L. SCHARNHORST, Capt, USAF
Maintenance and Records Team Chief

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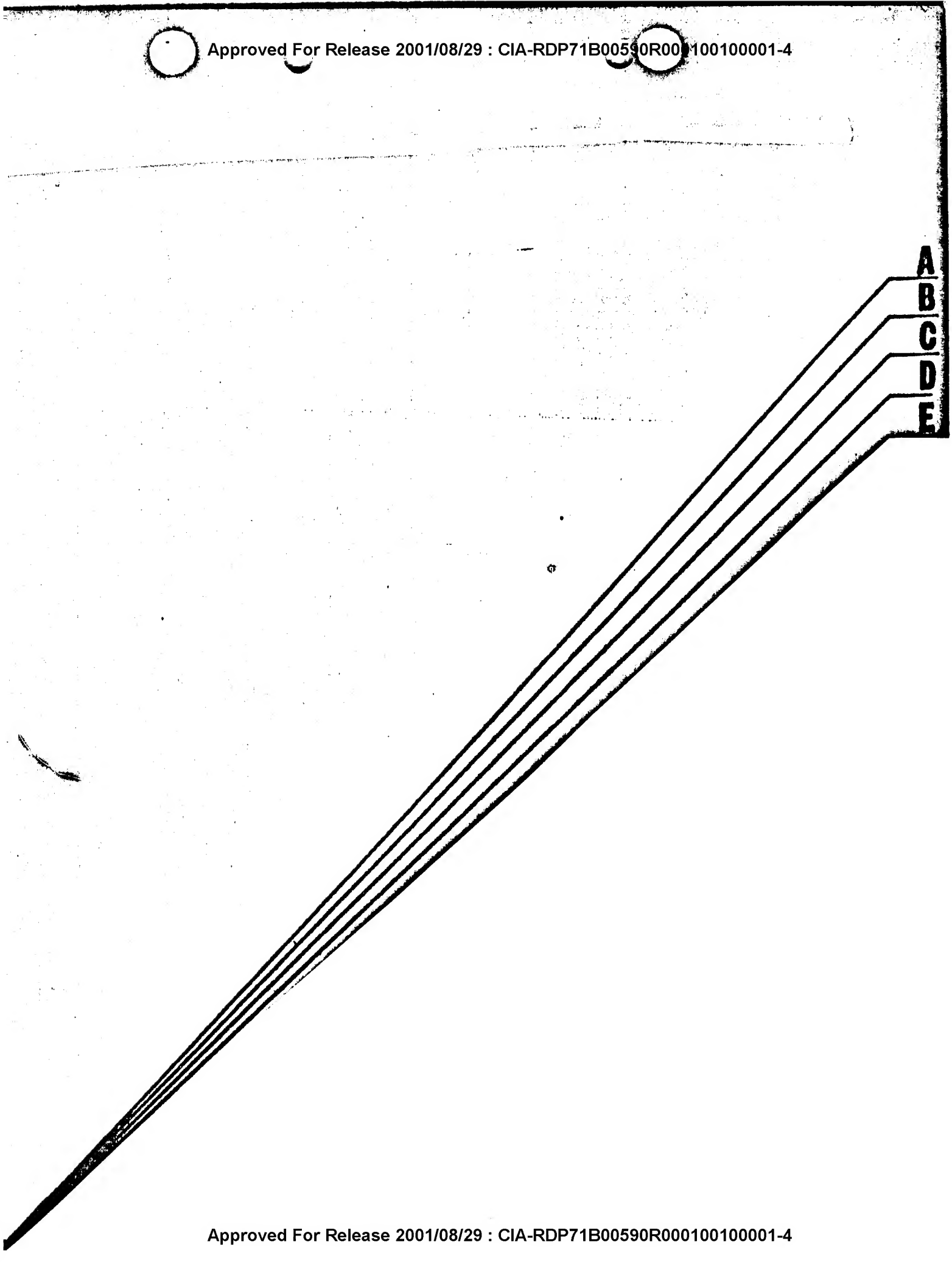

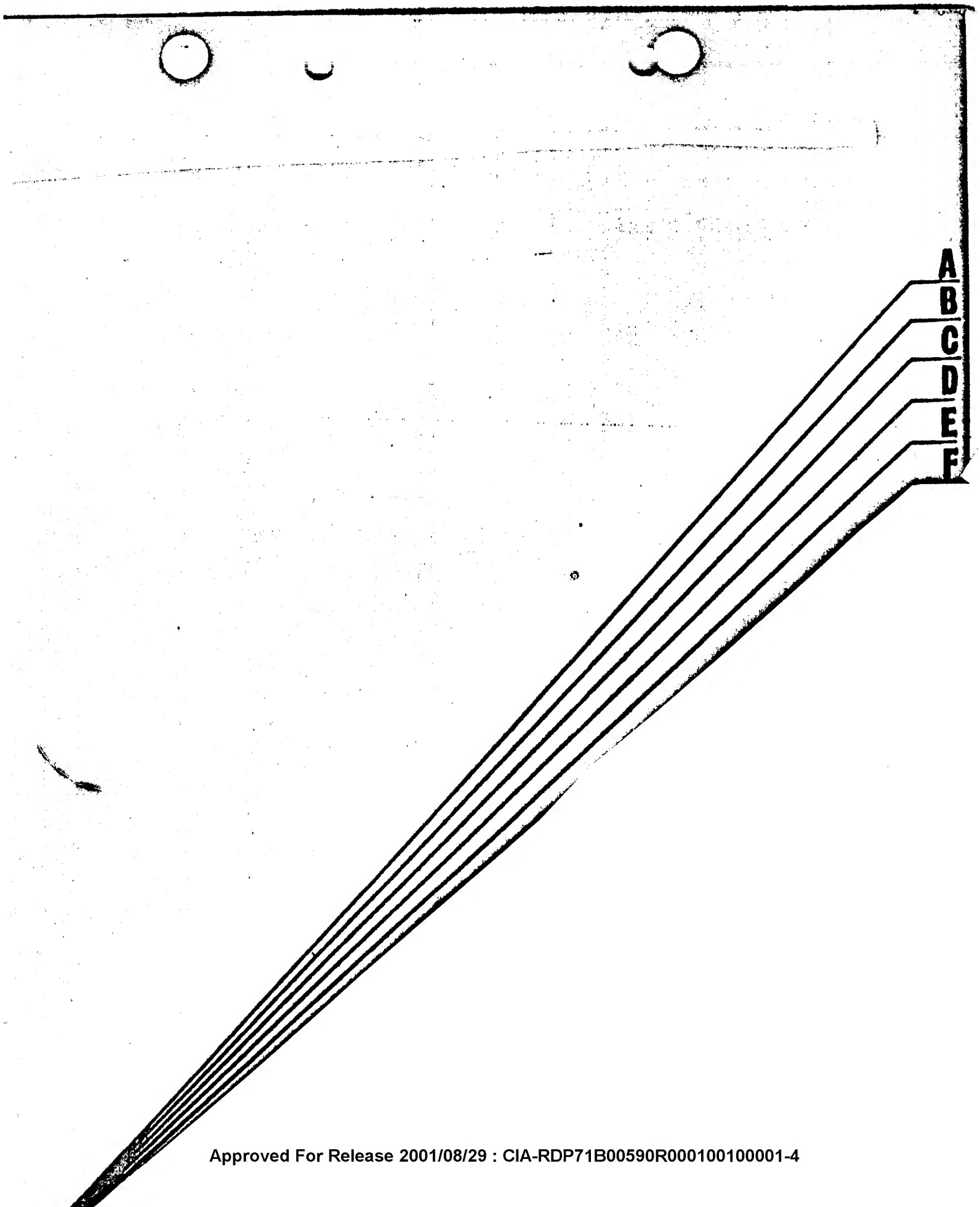

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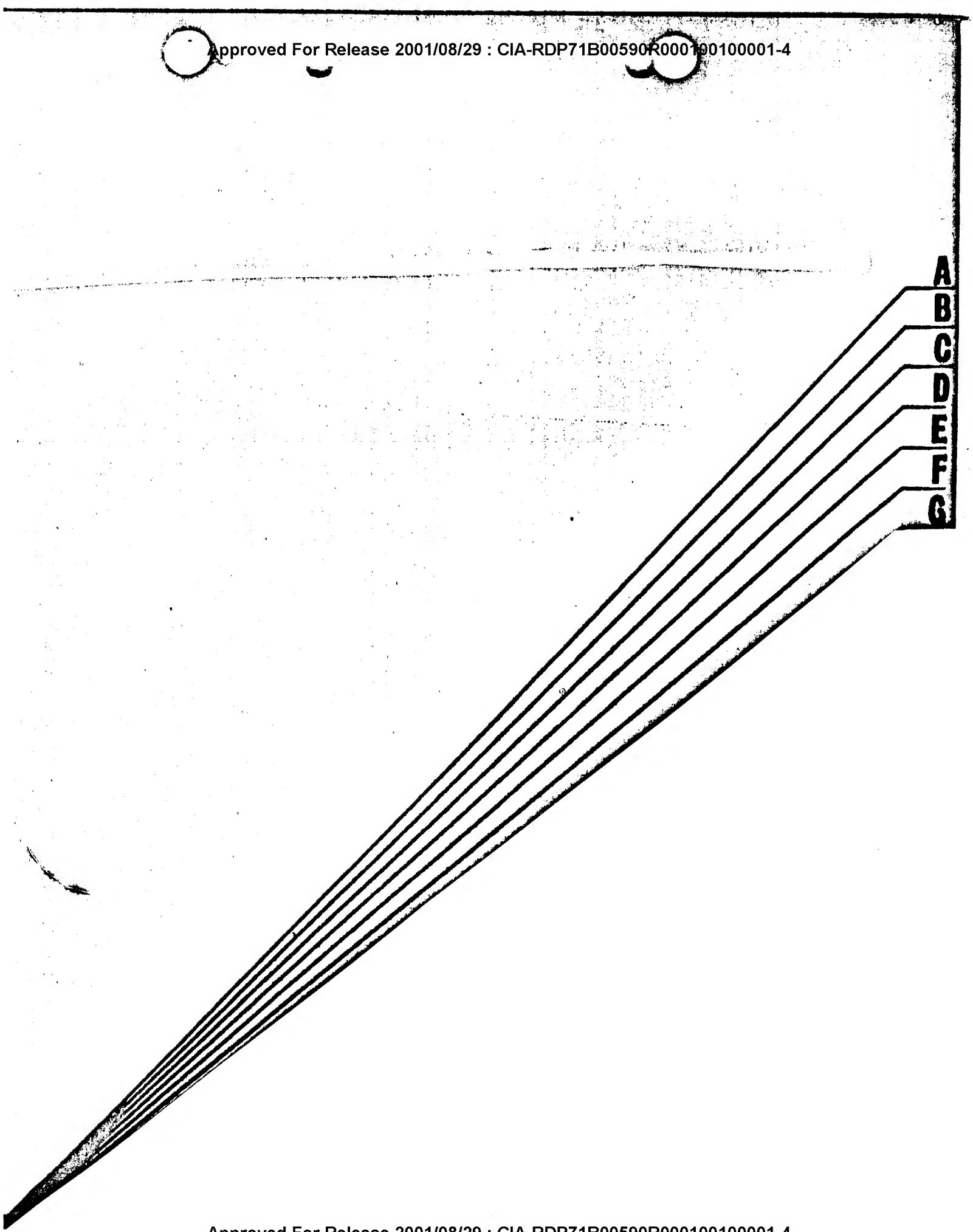

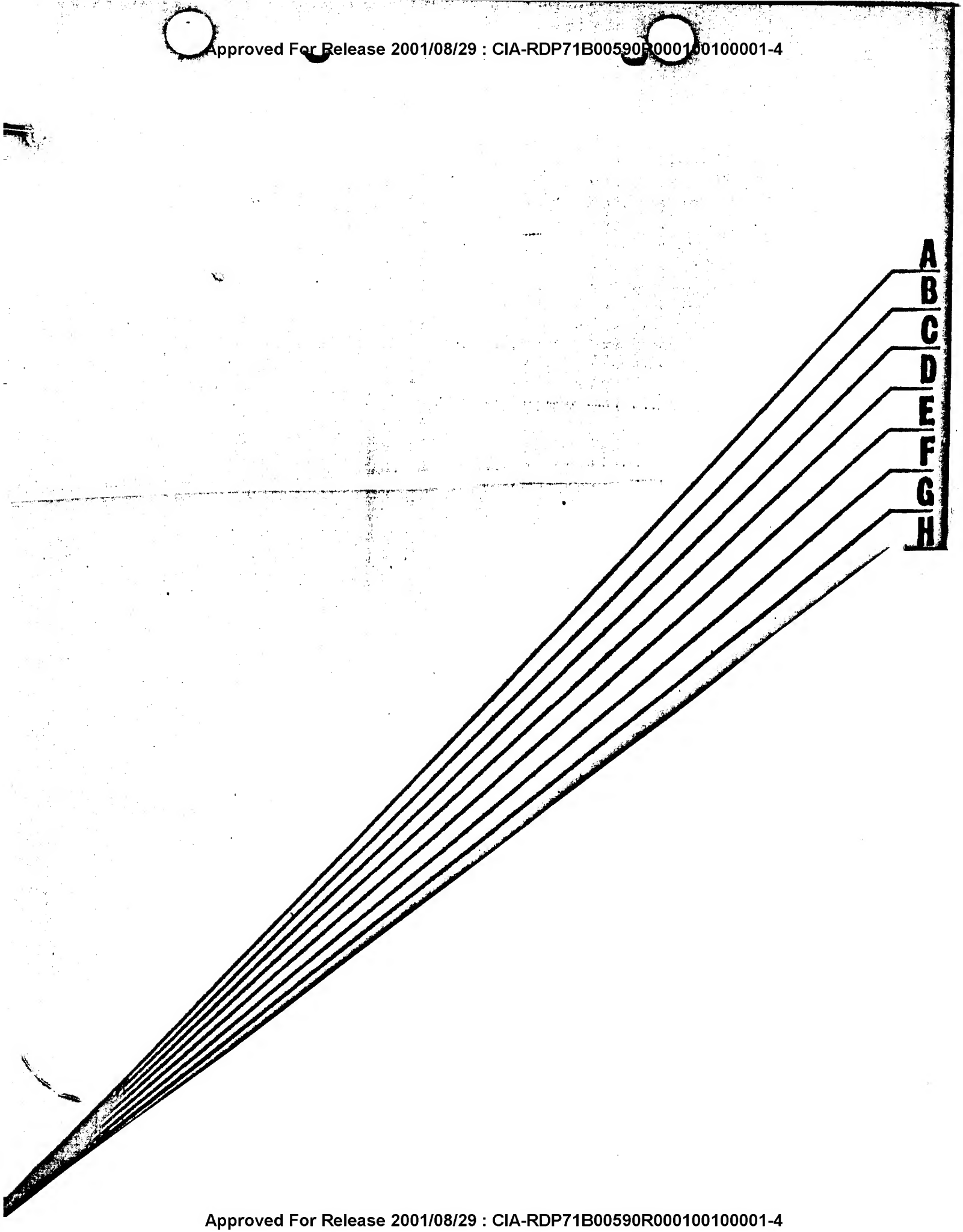

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Next 4 Page(s) In Document Exempt

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AF Form 711g, LIFE SCIENCES REPORT OF AN INDIVIDUAL INVOLVED IN AN AF ACCIDENT/ INCIDENT SECTION A. AIRCRAFT ACCIDENT/INCIDENT

Paragraph 3n.

The aircraft was engaged in a flight performance check with an aft center-of-gravity greater than 26%. As the aircraft was rolled into a bank, an unstart occurred on the lower engine. Because of the flight characteristics, the aircraft entered a slow, imperceptible pitch and the pilot had insufficient stick control. The pitch attitude of the aircraft continued until the forebody separated. The forebody continued to rotate in the longtudinal axis and it is speculated that, at about 135° of rotation to the original flight path, the chines separated and, as a result, both canopies fired.

What occurred after this point is pure speculation as both occupants in one way or another were extracted from the forebody. The suits and parachutes functioned normally and the occupants were returned to terra firma.

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SECRET
SPECIAL HANDLING REQUIRED

AF Form 711g, LIFE SCIENCES REPORT OF AN INDIVIDUAL INVOLVED IN AN AF ACCIDENT/ INCIDENT. SECTION A. AIRCRAFT ACCIDENT/INCIDENT

Paragraph 10, MEDICAL OFFICER'S RATIONALE, COMMENTS--

The manner in which the pilot escaped from the forebody is purely speculative. The bruises sustained are probably due to being thrown about the cockpit.

The pilot blacked out in the initial positive g loading as the forebody pitched up and decelerated. Apparently, as negative forces were applied to the pilot, the lap belt sheared. (See Photo Nr. 12.)

The unrestrained movement of the pilot then caused the automatic sequence of the parachute to be initiated. When the canopy fired, the pilot slid out of the aircraft as nylon burns occurred both on the shoulder straps and the stabilization chute cover. The most distal burns on the shoulder straps would indicate that the lap belt was pulled up around the neck ring of the suit. During this interval of time, the stabilization chute was deployed, and it, along with the weight of the pilot, caused the shoulder harness to part at the proximal point of attachment (See Photo Nr. 12).

The pilot regained consciousness during the free fall under the stabilization chute. He experienced very mild spinning which he could control by extending an arm.

His hands became numb from the cold and he experssed concern over not being able to locate the manual chute release. However, his fear was quickly dispelled when the main chute opened and he continued his descent to terra firma. He activated the global survival kit as soon as he could identify objects on the ground.

He landed facing the wind in an erect position and rolled over onto his back. The wind was estimated at approximately 5 knots and a surface temperature of plus 10°F. He did experience difficulty in releasing the capwell. Fortunately, his descent was witnessed by a rancher who arrived shortly after the pilot made contact with the ground. The rancher assisted in collapsing the chute. He was then transported in a helicopter to the nearest hospital.

Personal Equipment Finding STATOTHR

It is felt that [redacted] was rendered unconscious by high positive "g" forces during the pitch-up and subsequent aircraft breakup. Investigation reveals that this lap belt, like most aircraft lap belts examined, has a knurled roller bar which is part of the lap belt adjustment system. This roller bar has a sharp edge on each end and it is very simple to catch one edge of the lap belt over one of these edges. (See Photo Nr. 12.) It is apparent from the lap belt in this case that it was sheared from the bottom edge up. During the uncontrolled maneuvers of the forebody, the belt was broken and the pilot was thrown up into the canopy. (See Photo Nr. 13) An imprint of the back of the helmet plus paint samples from the helmet were found in the uppermost part of canopy. It is possible that shortly thereafter both canopies were blown off the aircraft. The pilot would have then been bent over facing forward with the top of the helmet facing the windscreen. This would have exposed the stabilization chute directly in the windstream. It would have also placed the torn lap belt under the pilot's neck ring and the shoulder harnesses stretched out behind him. (See Photo Nr. 12.) At this time, either the stabilization chute was deployed by wind force or had been deployed by the lanyard attached to the torn lap belt. There is evidence to support

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Personal Equipment Finding (cont'd)

either theory. The combination of the explosive decompression, plus a 2700 pound force being exerted by the stabilization chute, snapped Mr [redacted] from the cockpit. There is paint on the back of the main parachute pack which indicates that he was dragged quite rapidly over the head-rest. At this point, the shoulder harness was torn from the inertia reel strap. The lap belt and shoulder harness were found still attached to the stabilization chute riser which failed to jettison (See Photo Nr. 12). This then is a provable fact that the stabilization chute did deploy through the shoulder harness. STATOTHR

The rest of the escape system then took over and functioned well except for the damaged right stabilization chute release pin which failed to jettison the right riser. The main chute deployed on schedule at 15,000 feet and [redacted] raised the pressure suit face plate about one minute after main chute opening. He later deployed the survival kit which dropped on its lanyard below him with the life raft inflated. Parachute landing shock was stated to be mild to moderate with no injury. He rolled over on his back and head and at that time damaged the visor latch mechanism because he later stated when he stood up he could not keep the face plate up. His hands were still very cold and he could not operate the parachute canopy quick releases. The following is a description of the damage to [redacted] personal equipment: STATOTHR STATOTHR

A. Stabilization Chute

1. Covering torn.
2. Actuating cable housing almost completely severed.
3. Pin guide plate ripped from housing.
4. Both risers show signs of high speed dragging, evidenced by melted nylon on risers.
5. One suspension line cover is broken (no cords broken).
6. The skirt of the stabilization canopy shows evidence of very high "Q" forces in the lower four ribbons.
7. The stabilization pilot chute also shows high "Q" forces (See Photo Nr. 14).

B. Main Parachute and Pack

1. No canopy or suspension lines or risers damage.
2. The harness shows evidence of high friction dragging of the shoulder harness across it (melted nylon).
3. The main parachute pack shows evidence of being dragged across the headrest. Melted nylon and red stains from the headrest on the pack occurred prior to main chute deployment. This damage did not affect its subsequent operation or reduce its reliability.

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Personal Equipment Finding (cont'd)

C. Survival Kit

No damage - functioned perfectly.

D. Pressure Suit and Components

1. Helmet (See Photo Nr. 13).

a. Two gouges in the back of the helmet which were matched to two screws in to p of the aircraft canopy. (Paint samples analysis was done to confirm).

b. An impression in the top of the canopy between the two previously mentioned screws matched a mark on the back of the helmet.

c. The left hand visor latch was broken off. STATOTHR [redacted] statement indicates this happened on landing.)

d. Gouge on the sunshade latch.

e. Sunshade ripped off.

2. Outer Cover, Boots and Gloves

a. Gloves and boots essentially undamaged.

b. Outer coverall contained three very small rips, none of which are considered significant either by size or function.

c. The flotation garment built into the outer coverall was undamaged.

3. Pressure Suit

a. The pressure suit itself was undamaged.

b. One of the oxygen hoses was broken off at the silver solder joint. The other oxygen system hose was weakened at the same silver solder joint and failed after several minutes of operation under leak testing (See Photo Nr. 15).

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Item 10 (cont'd)

FINDINGS:

1. The pilot's lap belt sheared bilaterally in the area of adjustment.

2. The injuries that the RSO sustained indicate that he had undergone a high rate of spin.

3. One of the oxygen hoses on the pilot's suit was broken off at the solder joint. The solder joint on the other hose was severely weakened and separated while being leak checked.

4. The pilot's face plate iced over during the free fall thus obscuring vision.

STATOTHR [redacted]

6. It is felt that the pilot's lap belt sheared at a force less than specified in the military specifications due to the sharp edges on the knurled adjustment.

7. Neither the pilot nor the RSO initiated the ejection sequence.

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Item 10 (cont'd)

RECOMMENDATIONS:

1. Redesign the knurled roller bar on the lap belt adjustment to eliminate the sharp edges on each end.

2. Remove the stabilization chute from the man and utilize a stabilized seat as soon as possible.

3. Remove the oxygen hoses from the front of the existing suits as soon as possible. Modify them to the more modern configuration.

4. Provide bailout face plate heat.

5. A means be developed immediately to insure that all crew members can reach the headrest regardless of torso height.

6. The lap belt should be inspected prior to each flight for general condition.

7. A study should be made to determine the feasibility of an automatic ejection system under high altitude breakup conditions.

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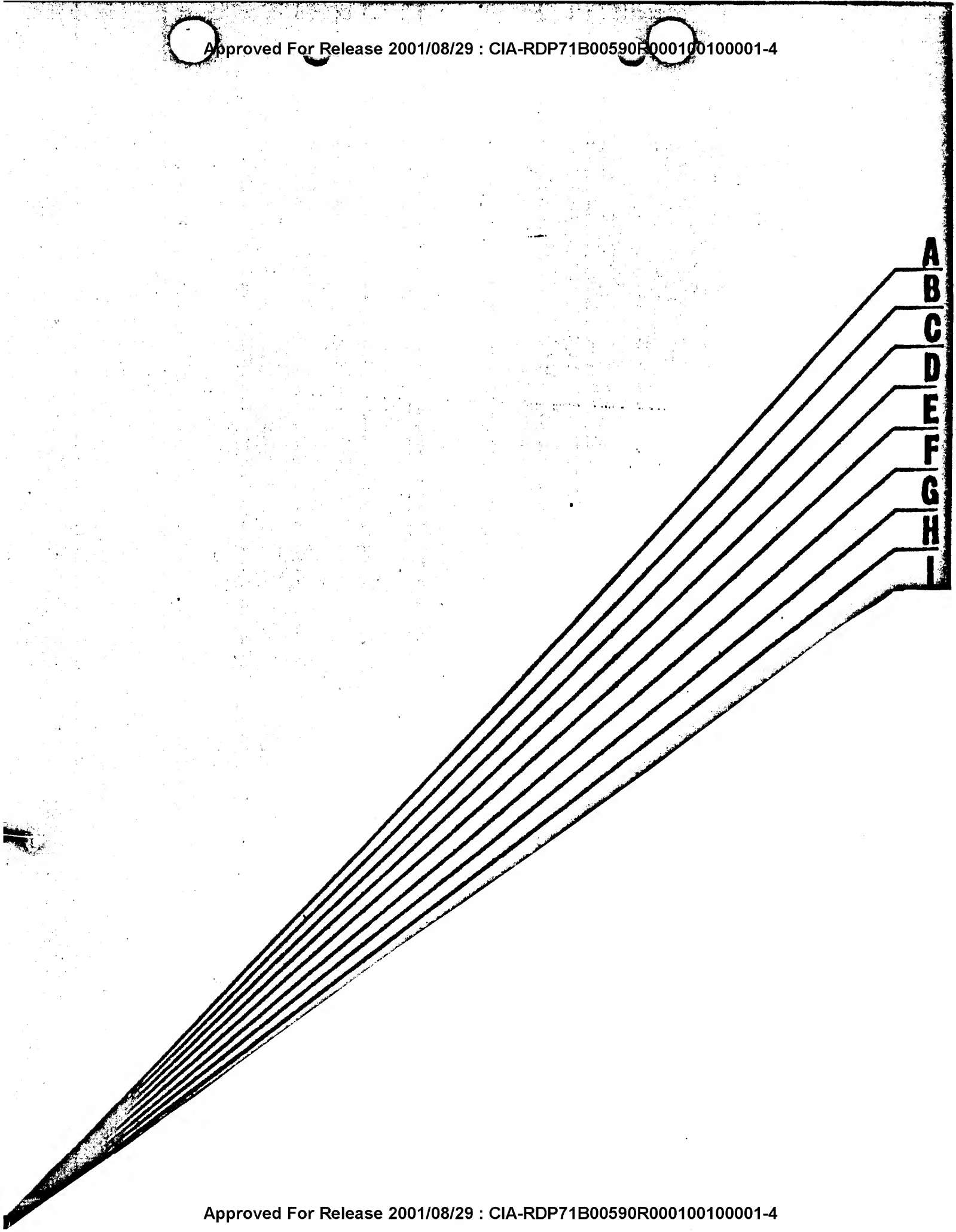

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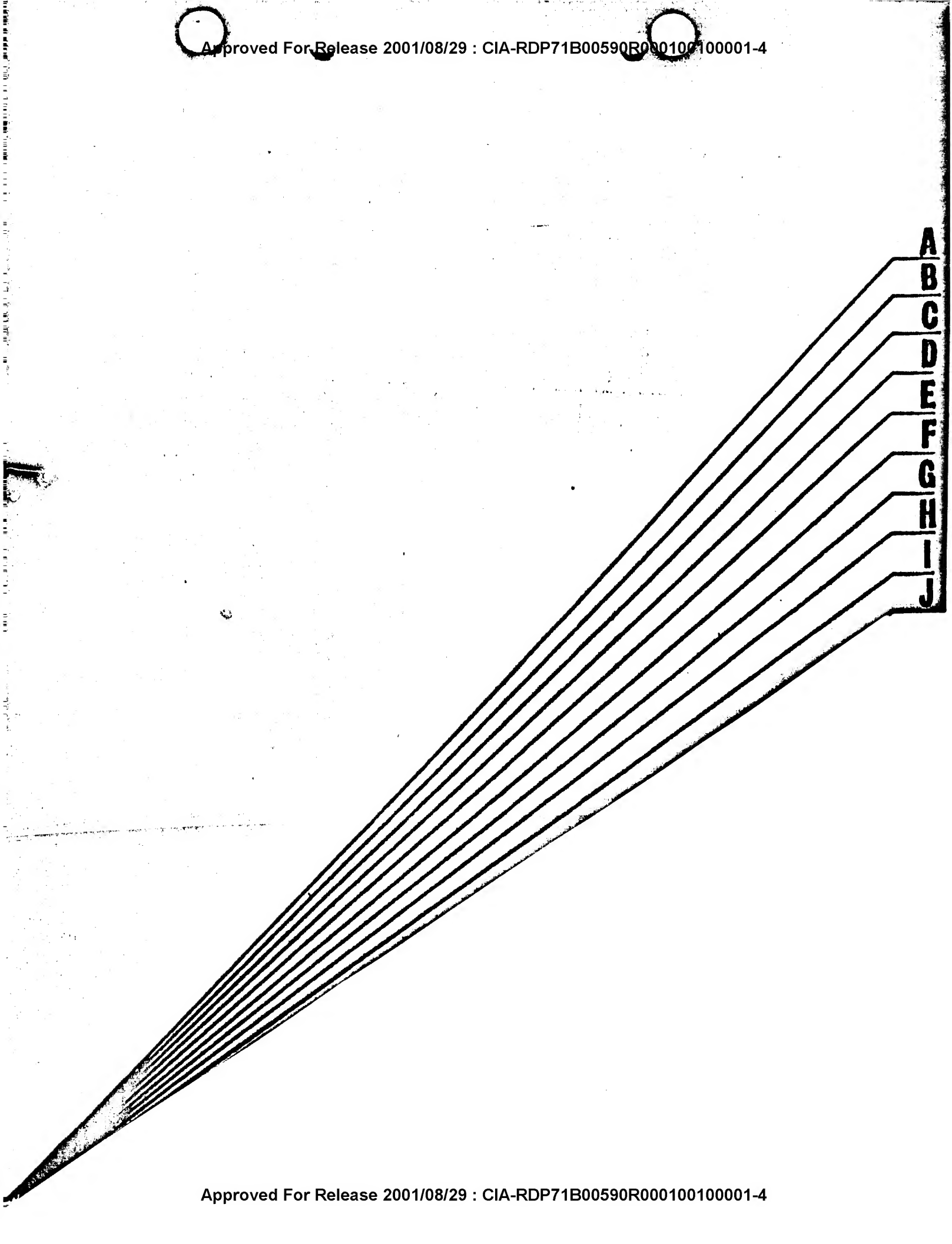

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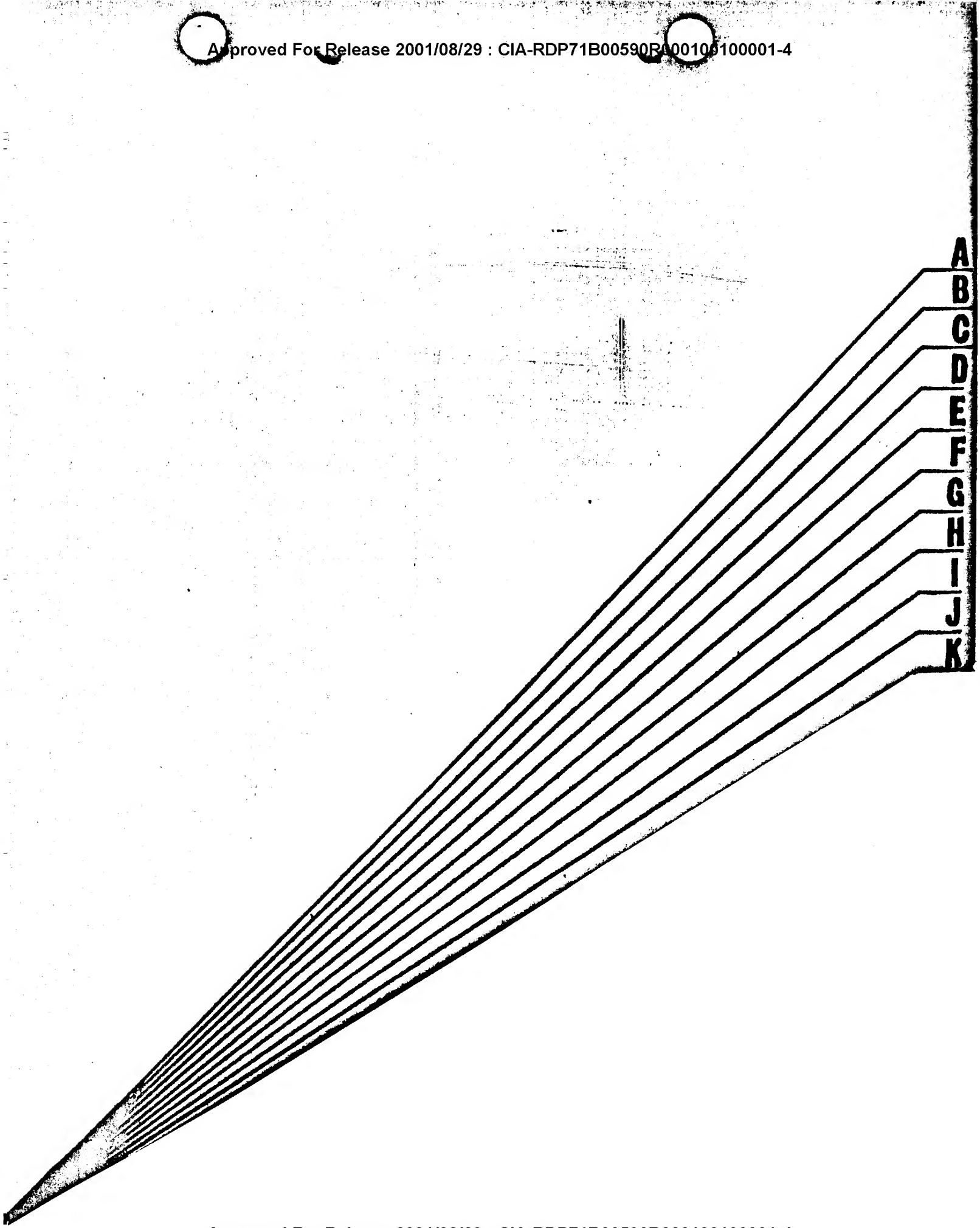

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S T A T E M E N T

Aircraft 2003
Flight #41
25 January 1966

[redacted] 25X1A

1 February 66

The crew briefing for flight #41 of aircraft 2003 was held at 0830 on 25 January 1966 with the following personnel in attendance:

25X1A [redacted]

The briefing began by discussing the flight route, weather, crew duties and support, ie: (Chase, frequency's and tanker call sign and refueling altitude).

The pilot briefing consisted of the following:

1. Aircraft configuration plus payload configuration and flight #40 squawks and corrective action.

2. Conduct takeoff test utilizing Sport 44 with engines trimmed EGT 50°C below max.

3. Dictet - Pilot to give time and events periodically during flight.

4. Select crossfeed when tank #6 goes empty for 4 minutes approximately, during cruise going Noah route to minimize excessive up elevon trim later in cruise. From results noted on Noah leg vary time of crossfeed "ON" during cruise on Eli route. Maintain positive elevon trim and stable pitch response.

5. Conduct special AICS configuration during decel - spikes and forward bypass doors "Auto"; select aft doors to position "A" before going to mil power; "Close" doors just before retarding throttles to 6800 RPM; leave forward bypass doors and spikes "Auto" all the way open.

6. Conduct drag chute test - (Emergency pull) at 190 KIAS on landing. Note: Chute will not jettison after emergency deploy.

7. The SR-3 compass is not working correctly since prior to the last flight when we installed a turn rate servo for test. Therefore do not fly the needle on TACAN, but fly the course bar.

8. Pull L/H throttle back to equalize fuel flows at cruise.

9. Fly the ball and not the yaw trim indicator.

/s/ /t/ [redacted] 25X1A

A TRUE COPY
Donald R. James
Donald R. James, Maj., USAF, Recorder

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STATEMENT

I, Albert J. Mitchell, make the following voluntary statement in connection with an aviation accident involving an Air Force aircraft which occurred on 25 January 1966 near Tucumcari, New Mexico.

I understand, and have been advised, that the sole purpose of the investigation is to determine all factors relating to the accident, and, in the interest of accident prevention, to preclude recurrence.

I was branding colts in our Headquarters corral when we heard a sonic boom. With me were Bernard Moon, Simon Martinez, and T.B. Laster all of Albert, New Mexico. I had my head down and didn't look up for about 30 seconds when Laster said he is on fire. I looked up and saw a white contrail going from West to East. I was about 1½ miles South of the path of flight. I looked West about 15 to 20 miles and saw the beginning of the contrail. There was a little puff where the contrail started then three (maybe only 2) more puffs almost due north of us about a mile apart. Then I could see the plane going down to the East still trailing the white contrail. This took about 45 seconds. I turned to Moon and told him to come help get out the helicopter. I got into Lasters pickup and started toward our airport looking Eastward. Just as we got to ranch cattleguard I saw two chutes with the pilots. One was about ½ mile north and ¼ mile East ([redacted] and 25X1A
the other further east. At this time I called the house to advise FAA in Las Vegas about crash. After crossing cattleguard look at chutes again and saw a third chute almost in line between the two other chutes or even further East. It was smaller and I lost it after this and never have seen it since. The plane was still falling trailing white trail. After opening hanger door I looked Eastward and saw plane about 10,000 ft in the air fluttering like a leaf. At about this time I could see flames but still white smoke. It took the plane a long time to fall this last distance. I wondered if it would ever hit. Upon impact a big black bollow of smoke 25X1A
rose. I continued to gas helicopter and start. I arrived at [redacted] about 30 seconds to 1 minute after he landed and helped him spill his chute. I 25X1A
told him that I was sure glad to see him alive. He said same. [redacted] face was streaked with blood but he could move and acted very sensible to me. I helped him remove face plate so that I was sure he could breathe and then I told him I had to get to the other boy. I also asked [redacted] 25X1A
how many were in the plane and he said just the one other boy. The second

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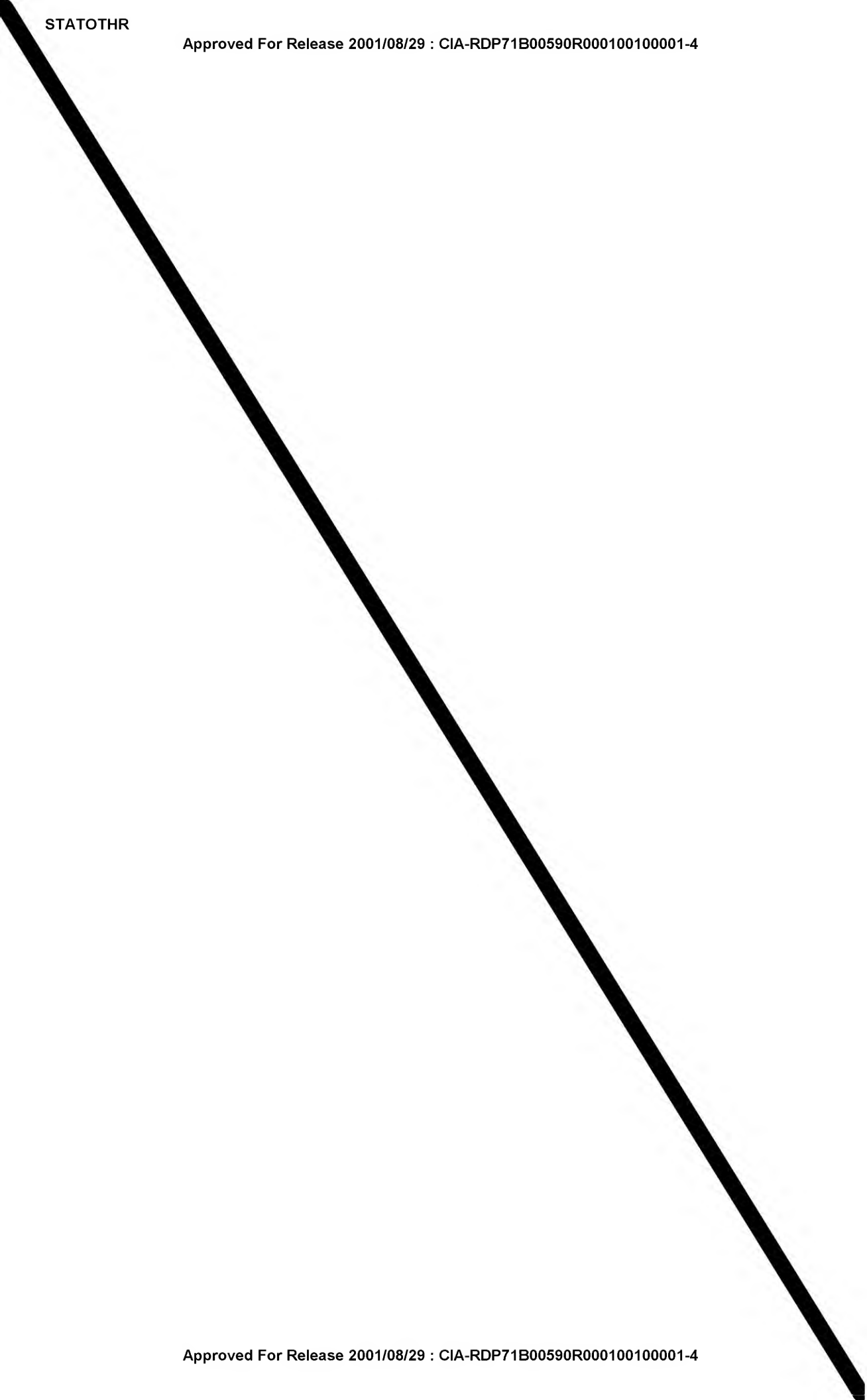

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STATEMENT

I, Norman N. Libby, make the following voluntary statement in connection with an aviation accident involving an Air Force aircraft which occurred on 25 January 1966 near Tucumcari, New Mexico.

I understand, and have been advised, that the sole purpose of the investigation is to determine all factors relating to the accident, and, in the interest of accident prevention, to preclude recurrence.

Norman Libby and Henry Olds talking at point on sighting plane hearing exp or sonic boom. Libby stated to Olds that one had broken sound barrier. Olds said "barrier, hell. It is on fire and falling". We both watched it from point of exp to point of impact. I checked my watch at time of sighting and found it was 24 minutes of three. It hit the ground at 20 minutes of three. Upon sighting it seemed to fly in a big arch. I left Olds at point of impact. I went to Mosquero called Cannon Air Base reported crash and returned to point of impact. Commanding Officer asked to keep all public away and to secure area. We could see nothing separate from plane or parachute from time of sound until plane hit ground.

Smoke for 30-40 minutes.

/s/ Norman N. Libby
/t/ NORMAN N. LIBBY
Bueyeros, New Mex.

A TRUE COPY

Donald R. James

Donald R. James, Maj., USAF
Recorder

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STATEMENT

I, Henry Alls, make the following voluntary statement in connection with an aviation accident involving an Air Force aircraft which occurred on 25 January 1966 near Tucumcari, New Mexico.

I understand, and have been advised, that the sole purpose of the investigation is to determine all factors relating to the accident, and, in the interest of accident prevention, to preclude recurrence.

Mr. Norman Libby and I were talking on Hwy 65 and I heard a boom. I looked up and saw this plane explode again. It kindly weaved around and then started to fall in flames. It looked like it came straight down after that. We first thought it broke the sound barrier. We rushed to the scene of the crash and it was all in flames. It looked like it hit straight down as it didn't bounce.

/s/ Henry Alls
HENRY ALLS
c/o Libby Cattle Co.
Bueyeros, N.M.

A TRUE COPY
Donald R. James
Donald R. James, Maj., USAF
Recorder

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STATEMENT

I, August J. Hayoz, make the following voluntary statement in connection with an aviation accident involving an Air Force aircraft which occurred on 25 January 1966 near Tucumcari, New Mexico.

I understand, and have been advised, that the sole purpose of the investigation is to determine all factors relating to the accident, and, in the interest of accident prevention, to preclude recurrence.

Ed. McMahon	Looking out of barn
Alex Navarro	Mr. Libbys Ranch

Alex Navarro called to the attention of a plane after a boom was heard. Ran to West barn door, seen what to me appeared a explosion. After seeing the explosion heard another boom which I believe was the aftermath of the explosion. Plane nosed up into a complete circle then gliding from side to side which appeared to be heading Southerly direction staying horizontal position. Just before drop seemed to nose down a little then tail section seemed to level off. Hitting ground aflame rose 500 to 800 feet. At arrival at the scene all sections were flattened down.

Was 2½ miles from crash site East

/s/ August J. Hayoz
/t/ AUGUST J. HAYOZ
Plant Supt.
Schwartz Plant

A TRUE COPY

Donald R. James
Donald R. James, Maj., USAF
Recorder

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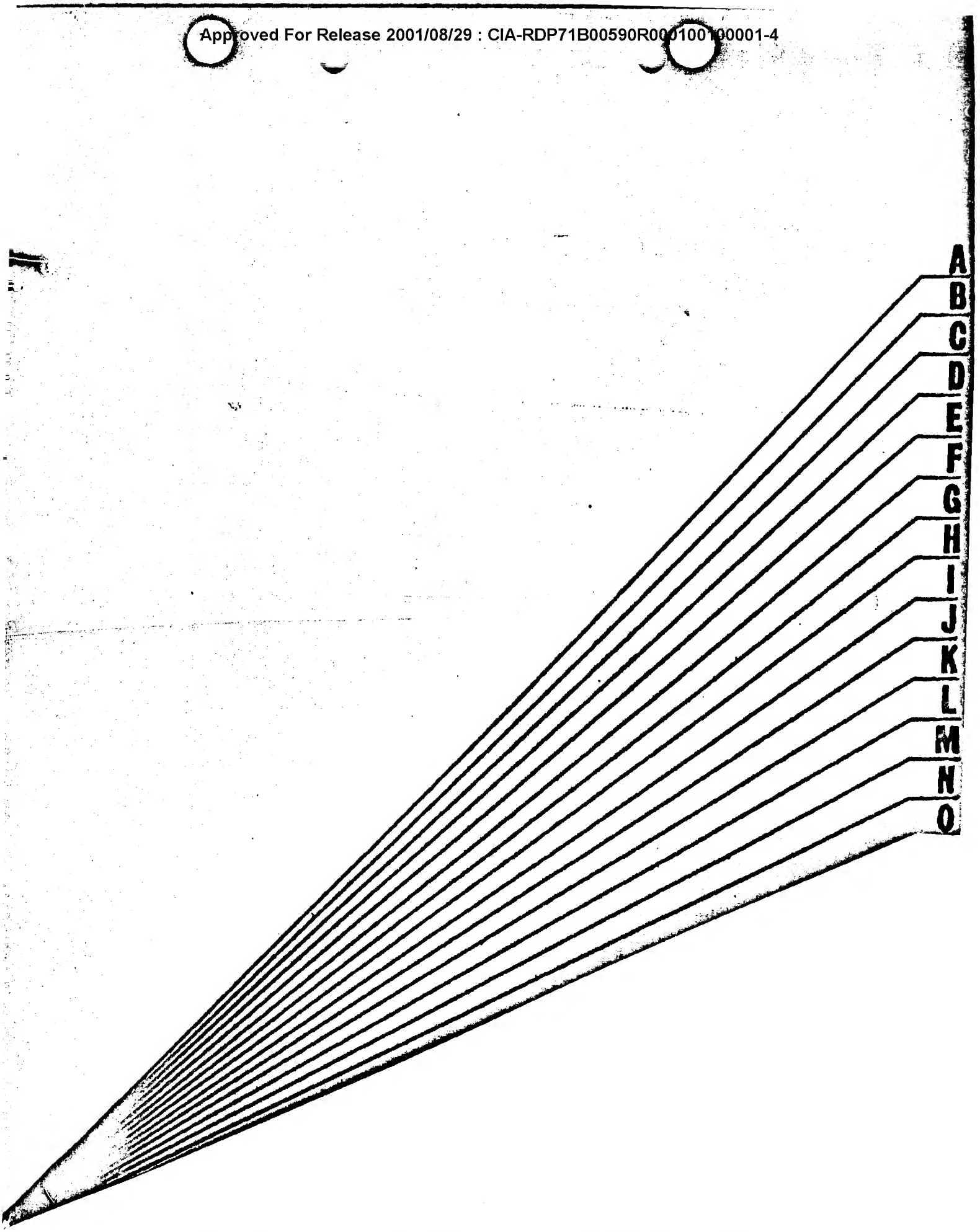

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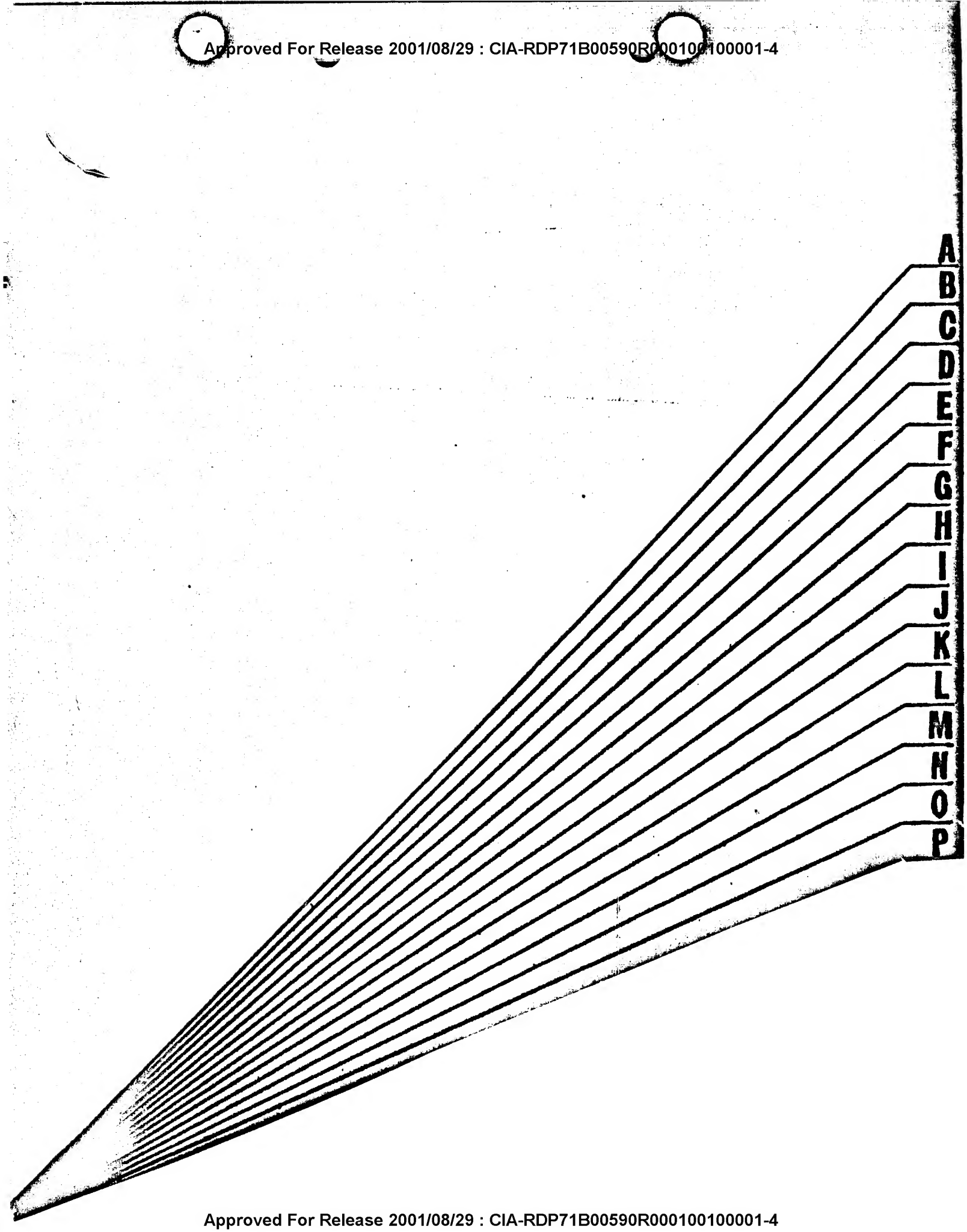

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, AIR FORCE FLIGHT TEST CENTER (AFSC)
EDWARDS AIR FORCE BASE, CALIF. 93523

SPECIAL ORDER
M-25

1 Feb 1966

The following named personnel, organizations and stations indicated, are appointed members of an Aircraft Accident Investigation Board under the provisions of AFR 127-4. *Indicates orders published with the approval of the individuals' organization Commander.

VOTING MEMBERS

GRADE	NAME AND AFSN	DUTY	ORGN AND STATION
*COL	JAMES G FUSSELL, FR6705	President	1002 IG Gp, Norton AFB, Calif.
*COL	HORACE A TEMPLETON, FR9349	Special Advisor	ASD (ASZB), W-PAFB, Ohio
*LTCOL	RAY C GORDON JR, FR16097	Material	1002 IG Gp, Norton AFB, Calif.
*LTCOL	IAN D ROTHWELL, FR36728	Investigating Officer	1002 IG Gp, Norton AFB, Calif.
LTCOL	WALTER F DANIEL, FR28225	Operations	AFFTC (FTTA) Edwards AFB, Calif.
MAJ	ROBERT E MATEJKA, FR59702	Medical	AFFTC (FTDTB) Edwards AFB, Calif.

25X1A

NON-VOTING MEMBERS

[redacted]		Material	1002 IG Gp, Norton AFB, Calif.
		Material	1002 IG Gp, Norton AFB, Calif.
		Material	1002 IG Gp, Norton AFB, Calif.
		Material	AFFTC, Edwards AFB, Calif.
LTCOL	RALPH N RICHARDSON, FV782011	Medical	AFFTC (FTDTB) Edwards AFB, Calif.
*MAJ	DONALD R JAMES, FR41908	Recorder	4200 SRW, Beale AFB, Calif.
CAPT	GORDON L SCHARNHORST, FR47150	Material	AFFTC (FTTA) Edwards AFB, Calif.

FOR THE COMMANDER

Hq. Air Force Flight Test Center OFFICIAL Edwards AFB

L. H. BENEKE, CWO, W4, USAF
Director of Administrative Services
M-25

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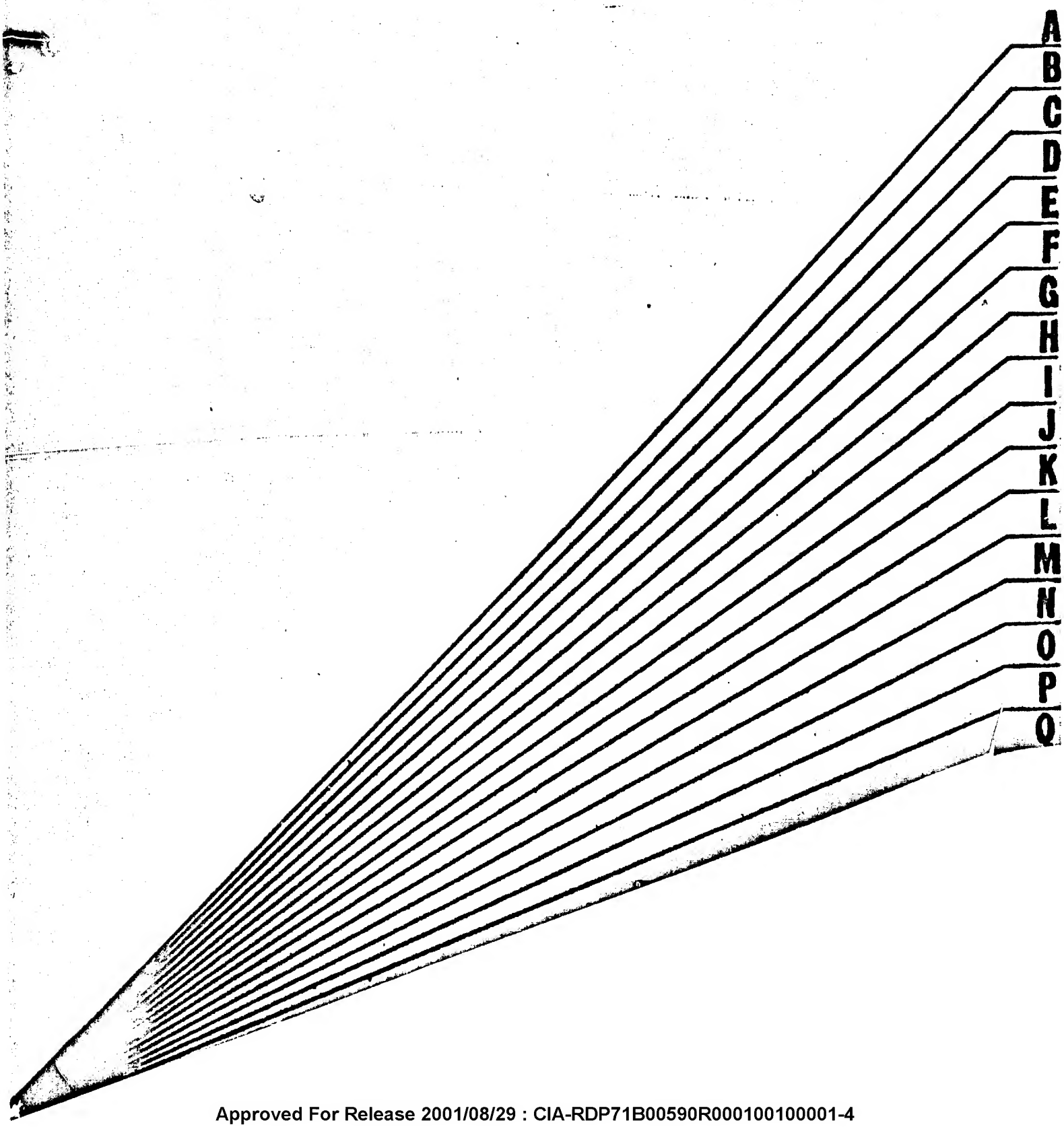

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BOARD PROCEEDINGS

The accident board arrived at Tucumcari, New Mexico on 26 January 1966. The pilot was interviewed at 0700 hours at the Tucumcari hospital. At this time they recorded his original statement. (attached) The board then proceeded to the wreckage site, some forty miles to the north of the town. the remainder of the day was utilized in assuring the security of the wreckage and in establishing a center for the activities of the board. The Army National Guard Armory building at Tucumcari became the center of all activities for the board.

Amarillo AFB, Texas, was notified that that station would be the logistical center for the operation. Manpower and equipment for removing the wreckage was obtained and put in place at the accident site.

The accident board convened at 0730 hours an 27 January. At this time the board president assigned specific duties to board members and advisors to the group. The meeting was then adjourned and the group proceeded to the accident scene to complete a detailed study of the wreckage. At the same time an intense air and ground search was being conducted for parts of the aircraft. In this connection two H-43 helicopters and crews from Reese AFB were assigned and performed shuttle and search operations during the board activity at Tucumcari, New Mexico. On this date no parts of the wreckage were moved or dismantled, since technical assistance personnel were still arriving at the accident scene from all parts of the country.

The accident board convened at 0730 hours on 28 January for the purpose of establishing that all possible data had been gathered prior to commencing reclaimation activities. It was agreed by all present that salvage operations should begin. During the period 28 to 29 January, all efforts were directed toward readout and salvage of the aircraft. The wreckage was placed on mobile equipment supplied from Cannon AFB, Kirtland AFB, Amarillo AFB, and Walker AFB. The accident board was then adjourned and directed to proceed to Edwards AFB for future activity. The aircraft was transported overland by convoy, accompanied by a security guard to Edwards AFB, arriving on 31 January.

On 31 January 1966 at 0800 hours the board was convened at Edwards AFB. Members of the group were directed to proceed to the wreckage area and accomplish a detailed examination of various components. The board spent the remainder of the day in laying out the wreckage and in detailed inspection and analysis of components.

The board was formally convened at 0800 on 1 February for the purpose of interviewing pilots with high experience in the SR-71 type aircraft. The board called [redacted] (transcripts attached). 25X1A
Subsequent to these interviews a team of board members were selected to conduct a series of tests at Beale AFB on the SR-71 flight simulator. This group departed Edwards AFB at 1300 hours. The tests were conducted on 2 February and the team returned to Edwards AFB on that evening.

At 0800 on the morning of 3 February the board received a briefing concerning the results of the tests performed in the SR-71 simulator. Then the board called [redacted] 25X1A
(transcripts attached). Subsequent to this interview the meeting was adjourned.

The board reconvened on 7 February at 0730 hours to deliberate on the Findings and Recommendations of the board.

Donald R. James
DONALD R. JAMES, Major, USAF
Recorder

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P I L O T S S T A T E M E N T

25X1A

[redacted] statement of the morning of January 26, 1966.

Present to hear his statement are Colonel Templeton, Lt. Colonel Daniel, Lt. Colonel Rothwell and Mr. Miller

25X1A

[redacted] I'd like to explain AFR 127-4, paragraph 16. "That the sole purpose of the investigation is to determine all factors relating to the accident and in the interest of accident prevention, to preclude recurrence. The investigation will not be used as evidence, or to obtain evidence for use disciplinary action, to determine pecuniary liability or line of duty status, or to revoke commission, or to support a demotion or to remove from the active list under the provisions of AFR 36-2, or for use before a flying evaluation board.

25X1A

This is [redacted] pilot of Ship 2003, Tail Nr. 952, flight on 25 January 1966.

I'll go through a debriefing of the whole flight.

The engine start on both sides was normal. Except on the right side the right hydro did not come up to 3300 until the engine was up to Idle. However, I was informed by the Engineer that this is fairly normal in this airplane.

Prior to start, while I was punching the manual tanks, the Nav system dumped so we had to wait another 17 or 18 minutes to realign the Nav system. All of the pre-taxi checks were normal. We taxied out to the end of the runway and trimmed the engines up to 794 on each side for a takeoff check with Askania, Sport 44. We tookoff on runway 4. After a countdown with Sport, added power, release brakes.

Takeoff rotation was at 192 and lift-off was about 212. Gear retraction after takeoff was normal.

I came back to Minburner and turned left toward our outbound track of 336 true, to our modified NOAH route. I noticed the left A/B went out in the Min A/B position. I came back to the Min A/B stop after takeoff and the left burner went out. I relit that and continued climb at about 400 KEAS up to .88 Mn. At .88 Mn and on up to 32,000, I nosed over at .88 Mn and 32,000 and to full A/B, accelled on up to 450 KEAS, established the 450 KEAS climb schedule. This accel took me down to about 28,000 and around .19 Mach. When I hit 450, I noticed that pitch trim was a little higher than normal in this area. It was about three to four degrees nose up.

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Our takeoff fuel load had been max. It was indicating 82,200 at engine start and 78 something at takeoff. The climb and accel was fairly slow from that point on. The CIT's appeared higher than normal.

Inlet schedule for takeoff was: Spikes - Auto, Forward Doors - Manually Closed, and Aft Doors - Closed.

At 1.7 Mn Pos "B" was selected on the aft doors and prior to this time, there had been about a half psi lag between left and right CIP. The left CIP was half psi below the right. This disparity continued after selecting Pos "B" on the Aft Doors.

At Mach 2.3 the forward doors were put in the Auto position and CIP's responded normally.

At 2.6 Mn, the Pos "A" was selected in the Aft Doors and just prior to this, inlet roughness occurred, some mild roughness, and, after going to Pos "A", the roughness increased in intensity. The roughness persisted out beyond 2.8 Mn.

At 2.8 Mn I placed the aft door switches to the closed position. In Pos "A" I noticed the aft door lights flickered for considerable period of time. The right light flickered for maybe 15 or 20 seconds and then went out. The left light flickered for, or stayed on continuously for maybe a minute and then started flickering and finally went out but I didn't notice any unusual CIP indications at this time. When I went to closed on the aft doors at 2.8 Mn, both lights responded normally. They indicated transient operation and then went out.

Above Mach 3.0 the inlet roughness diminished and the inlets were fairly smooth beyond Mach 3.0 on this accel.

Further after takeoff Auto-Nav was selected and it steered us to our desired outbound track and it maintained track to what appeared to be perfect throughout the entire leg of the NOAH route. Northwest of Fallon, the Auto-Nav programmed us into a 35 degree right bank. At this time we were at about 2.8 Mach, and it turned us into a heading of 050 true. This was held for about one minute through program and then the Auto-Nav turned us left in approximately a 35 degree bank, sometimes as high as a 40 degree bank to the left. I rolled it out whenever it got above 35 degrees back to between 30 and 35 degrees. This steered us around the far turn of the north end of the route and brought us back on track southbound. The southbound track again appeared to be the desired track. We hit 3.2 Mn in the turn, and maintained between 3.1 and 3.2 Mn southbound. The Auto-Nav programmed again about 65 miles north of Santa Barbara and took us over Edwards.

A decel was started west of Daggett and the Auto-Nav programmed the turn at Daggett toward Beatty. The decel was made with the aft doors positioned to A, 15% open, and there were no unusual inlet disturbances on the decel.

At 2.5 Mach, the aft doors were closed. Throughout the decel the Spikes were Auto and the forward doors were Auto. At 2.5 Mn the aft doors were closed and the throttles retarded to 6800 RPM.

We decelled back in the SOA, and made contact with the tanker, FATE 53, at 27,000 feet refueling altitude. We hooked up when he was at the south end of the refueling track just starting his turn. We stayed hooked up to the tanker until we had about 58,000 lbs. We were indicating 315 knots IAS at 27,000 feet. At this time I was power limited in Mil with 58,000, so we dropped off and I lit the right A/B and attempted to re-engage. I didn't trim out the rudders - I just left it in the yaw. The boomer operator said that he couldn't make engagement in this yawed condition so I had to trim out the rudders and get fairly well aligned with the tanker. After trimming out the yaw with the rudders, contact was made and we stayed on the tanker through the north turn and dropped off just after completing the turn, at the north end of the track. At that time, we had 80,000 lbs indicated. We then cleaned up the bird, and closed the refueling doors.

Prior to refueling, I'd transferred forward about 6,000 lbs in tank 1. I had turned off forward transfer before refueling engagement.

We commenced the second accel heading south 160 true, again engaged Auto-Nav on this south leg and Auto-Nav programmed us perfectly onto our track toward Boulder. The second accel was made with the same inlet configuration as the first. The forward doors had been placed in manual closed, the aft doors closed, the Spikes Auto.

Then again at 1.7 Mach the aft doors were to position "B". At Mach 2.0 I placed the forward doors to Auto. At 2.6 Mn the aft doors to "A", with the same light indications as previously in Pos "A". The lights stayed on an excessive length of time, the aft door lights.

At 2.8 Mn the aft doors were closed and at 2.9 Mn I noticed a yawing in the aircraft which put the aircraft in a 20 degree right bank. I first attributed this to the Auto-Nav because the yaw wasn't really noticable. It was more noticeable as a roll. However, checking CIP's I noticed that right CIP was about 4 psi below the left. I assumed this to be the forward door opening so I rotated the right forward door switch clockwise

and the CIP increased on the right side. I rotated the door switch until it matched the left. From that point on in the accel I used the manual right door schedule to maintain the right CIP fairly close to the left. This occurred at 2.9 Mn on the second accel.

I had had some inlet roughness at about the same point on this accel as on the first. However, during this period the inlets were fairly smooth, during this period of manual door operation.

The Auto-Nav was taking us along our eastbound leg right on track. We continued the accel on up to 3.18 to 3.2 Mn. I noticed at about 3.18 Mn our CIT limit had been reached. Also on the first leg southbound I noticed that we had to back off a couple of times from our 400 degree CIT limit at 3.2 Mn. Our max Mach on the first leg had been 3.22 and max altitude 83,000 feet. In a couple of areas I had to decrease Mach to lower the CIT below 400. The max CIT on the flight had been 405 before I backed off. So this occurred on the eastbound leg and I backed off to approximately 3.15 Mn and about 78,000 feet, just short of the turn at Dalhart, on the east end of the leg.

25X1A

I remember checking with [redacted] and asking him when he expected the turn point to be reached and he said in approximately 20 seconds. At this time I added a little bit of power, approximately 3000 lbs fuel flow on each side. Because I wanted to maintain approximately the same altitude throughout the turn. So I was 3.15 Mn and between 77,000 and 78,000 at the start of the turn.

The Auto-Nav programmed the turn at exactly the right moment and put the aircraft into a 35 degree right bank, between 30 and 35. After about 20 degrees of turn the conditions were: I'd like to back up a minute.

Just prior to the turn I called out a fuel reading of 42,200 lbs and a pitch trim indication of 2½ degrees nose up. The pitch trim on this second leg was considerably lower than on the first. On the first leg we almost ran out of nose up pitch trim in level flight. In the turns excessive back pressure was required on the stick to maintain level flight. As I was saying on the first leg the pitch trim was excessive throughout the accel. It got as high as 7 degrees nose up in level flight southbound.

We took a lot of individual tank readings. In the turn on the south end of the NOAH route it was 8 degrees and required a lot of back pressure. I had attempted using crossover on the southbound leg of NOAH to alleviate this c.g. condition. But it had no noticeable effect on pitch trim. I left crossfeed on for 7 minutes.

We had discussed this before flight and decided on using crossfeed in lieu of tank 2 manually. But after the lack of effect of crossfeed I decided on the second accel I would select tank 2 manually for a short period to see if that improved the c.g. situation. This was not necessary because on the second leg the c.g. was noticeably further aft. The max elevon pitch trim was 2½ degrees up and I noticed this condition just prior to the turn at Dalhart, the east end of the ELI route.

The aircraft felt very stable in pitch at this time. I had no indication of sloppiness which we have had on occassion. The only unusual control indications I noticed in the flight were, of course, the extreme forward c.g. requiring the excessive back stick pressures on the first leg and also during this stick input in the turns, excessive back stick input I noticed some roll feedback, slight pulsing roll feedback, in the stick, in Auto-Nav.

After about, I would say, 15 degrees of turn, 30 to 35 degrees right bank angle, at the east end of ELI, the conditions were: approximately 3.17 Mn, and approximately 77,000 to 78,000 feet. Just after starting rolling into the turn I cranked down the right CIP by opening the right forward bypass slightly, so the right CIP would lag the left by about ½ psi. Hopefully giving me unstart margin in the turn. However, about 20 degrees of turn I experienced an unstart on the right side. The aircraft went to approximately 60 degrees right bank from 30 to 35. I attempted to correct the excessive roll angle with opposite roll input and glanced over at the restart switches and CIP's and I could see the split in CIP's. The right CIP in this glance I got, looked like about 4 and the left looked to me as it was approximately 14. Prior to that both CIP's had been about 15. The right one had been lagging the left because of the forward door. After looking at the CIP's and, of course, realizing the increase bank angle, I knew it was the right inlet. However, I remember thinking I'll hit both restart switches anyway because I felt that might help alleviate the excessive roll. I then glanced again from the restart, CIP area and I noticed that there was no responce to my roll correction. It was maintaining about the same bank angle, which I would estimate at 60 degrees, although I had just about full opposite control.

25X1A

At this time I recall thinking of [redacted] incident, which was similar to mine, this went through my mind in a split second. I remember thinking, well at least it isn't 90 degrees like [redacted] had.

25X1A

About the same time as that I recall thinking I had better get the nose down a little bit and reduce this roll coupling input by lowering the angle of attack. I just discussed this subject a couple of days prior to the flight with one of our Aero Dynamicists. I pushed forward on the stick, maintaining the left aileron input, with no effect on the bank angle. Shortly after putting in some forward stick the nose started coming up. The nose came up at an extremely rapid rate.

The last thing I remember was I had the stick in the left forward corner of the cockpit with the nose coming up at a very rapid rate above the horizon. I remember seeing blue sky and thinking - My God this is Pitch Up. Which is what it appeared to me to be. It looked as if when the nose came up that the bank angle had diminished somewhat, but I couldn't say for sure. I can't estimate the pitch rate except that it was very fast and I couldn't really say how far up it went because from that point on everything was total confusion. The only thing I can remember after that were a couple of thoughts that went through my mind. I didn't notice any "g" effects on me personally, although I'm sure thry were present. I do recall thinking that I had better stay with it as long as possible. However, I don't have any conscious recollection of what was happening outside.

I've gone over this many times trying to estimate the time span involved. I would estimate that from the time of the unstart until the nose was well above the horizon, in this pitch up situation, was approximately 5 seconds. The entire episode happened so fast I didn't have a change to get scared or think about ejection or anything else.

After this I remember thinking that I should stay with it as long as possible and then I heard a loud noise and what sounded like a bang and rushing. I don't believe that I was fully conscious at this time but I could hear these things happening and I felt as if I was tumbling or being thrown about. Then I don't remember anything for awhile.

After that I remember thinking I was tumbling or anyway I don't have any conscious recollection of what was happening except everything was kind of jumbled and mixed up and confused. I couldn't see, everything was black. I thought to myself that I was dreaming. After this I regained consciousness or simi-consciousness and thought I had to be dead if what had really happened, really happened.

After this the next thing I remember was the rushing of air, the quiet rushing of air and I thought maybe I was falling. Pretty soon I realized I was falling and I woke up. I could open my eyes and see the faceplate which was completely

iced over. I could feel some of the straps flying up and I could actually hear them slapping against the suit and faceplate.

I was falling vertically and rotating slightly. Then I realized I could control my rotation somewhat by extending an arm or a leg or by bring my arms in close to the body. So I attempted to do this to keep from spinning. I was worried about rotating too rapidly. I knew, of course, that the stabilizing chute had deployed and I was descending with the stabilizing chute because my feet were down and I was, what appeared to me to be, vertical.

I noticed that the suit was inflated and I felt kind of numb and cold. My fingers were very numb. I thought about trying to find the manual parachute release, in the event that I had to use it. With the gloves and the stiff fingers I could not identify it by feel. I would like to recommend that we go back to the old "D" ring which you can put your hand in. The fact that I could not feel that manual release concerned me a little bit.

I don't have any idea how long I fell with the stabilizing chute. It didn't seem like an excessively long time to me until the main chute opened. The main chute opening shock was not bad at all.

After that I opened my faceplate, because I knew I was low enough. I looked around and one of the first things I
25X1A was was [redacted] chute. It looked like he was ¼ of a mile away from me and he was slightly lower than I was. I was very happy to see that chute, of course, I thought that he was alright too. Then I saw the wreckage. The wreckage appeared to be about 5 miles east of us. It was burning. I continued on down looking for roads and buildings trying to find out which way I was going to go when I got on the ground. Also trying to feel if there was any damage to me. I could feel blood in my nose so I knew I had a bloody nose. Other than that I felt alright except for the cold.

I tried turning the chute to keep Jim's chute in sight but my hands were so numb and cold that I couldn't effectly pull on the visors to turn the chute. There was no oscillating of the chute. It was perfectly steady just a slight drift. When I felt I was getting fairly close to the ground I released the survival kit and it extended properly. There was an antelope right underneath me on the way down. I thought it was a deer but the rancher told me it was an antelope later on. So he ran away and I landed. I rolled over on my back. The landing impact was very moderate.

After landing my first concern was dumping the chute canopy, It dumped by itself and then the breeze caught it and it inflated again but it wasn't dragging me. It was just a slight pull. However, because of the numbness in my fingers and the inaccessability of the rocket jet release mechanism I could not actuate the rocket jet release to spill the chute canopy. I would like to see a modification on that.

While I was fooling around with the rocket jet release I heard a noise that sounded like a helicopter but I couldn't believe that there would be a helicopter there because this country, on the way down, looked very desolate. However, sure enough it was a helicopter and this man came over to me and asked me if I was alright and helped spill the canopy and weighted it down so it wouldn't inflate again. He tole me at that time he had seen both of us come down and he was going over to help Jim, whose canopy he said was also inflated. He said, he looks alright but he's having the same trouble you are with the canopy. So he got in the helicopter and went over there.

In the meantime I was able to release the parachute harness. Not without a little difficulty. Also my visor would not stay up so I held my visor with one hand and released the chute mechanism with the other.

When I finally got free of the chute, [redacted] the rancher, came back and said that Jim hadn't made it. He said his face was black. He had removed his helmet and taken his pulse and said there was nothing. STATOTHR

STATOTHR [redacted] helped me get my helmet off and then his manager came by in the pickup truck and said he would take care of the parachute and the gear. [redacted] took me in the helicopter and flew me to Tucumcari Hosipital. STATOTHR

I went over with him, [redacted] to Jim and realized that there was nothing we could do for Jim so we covered him up with the chute. His manager said he would take care of him. STATOTHR

QUESTIONS

Question: 25X1A Bill, do you recall at any time during the flight of any SAS problems, any SAS warning lights or malfunctions of the SAS System?

[redacted] I don't recall any SAS warning lights or problems at all.

Question: 25X1A Particularly during the pitch up maneuver itself did you notice any?

[redacted] I couldn't see any warning lights at all. I thought about that a lot and if there were any lights on I didn't see them. There might have been but I couldn't say if there were or not. Mainly because it was happening so fast, if they would have come on they would have had to attract my attention because I wasn't looking for them.

Question: 25X1A Do you recall, other than the right inlet proplem, any other inlet problems during the flight?

[redacted] None at all except for the aft bypass door lights staying on.

Question: 25X1A How about the engines itself, any problems with the engines throughout the flight?

[redacted] No, the engines operated real well. The right oil pressure fluctuated plus or minus 1 psi. At about a certain period on each accel we got stabilized. The right got down as low as 36 psi, up to about 39.

Question: 25X1A How about the Autopilot. Was there any difficulty with the Autopilot?

[redacted] The Autopilot operation was very nice. The only function I used was Auto-Nav, however, I didn't use Mach or Pitch Hold.

Question: 25X1A During the unstart and subsequent roll and pitch maneuver do you recall the Autopilot disengaging or you disengaging it?

[redacted] This is one thing I'm not sure of, whether I disengaged it or it disengaged. I really can't say. I don't remember consciously disengaging it.

Question: How about the Hydro Systems?

[redacted] I was watching the hydros closely all the way through because they had had hydro problems in the flight before. They had loss of "L" and "A" on the previous flight, but the pressure stayed up and there were no lights.

25X1A

Question: Just prior to the unstart or during the unstart did you happen to notice any hydro pressures?

25X1A

[redacted] Not that I recall. Periodically I'd call out all the engine parameters and pressures into the recorder. I recall that each time I called out hydro that they were right where they had been on the ground.

Question: In the unstart subsequent maneuver do you recall any warning lights coming on, Master Caution or other Annunciator Panel lights?

25X1A

[redacted] No I don't. Again I was trying to think of that afterwards. I didn't see any.

Question: How about the fuel derich was there any indication that it had activated?

25X1A

[redacted] No there wasn't. Not that I noticed.

Question: Bill, do you recall taking any individual tank readings, just prior to the unstart?

25X1A

[redacted] Yes, I took tank readings, I would say, maybe 5 minutes prior to that. I can't recall any of the readings.

Question: Do you recall them being unusual?

25X1A [redacted] No.

Question: Was there a dictet onboard the airplane?

[redacted] There was a dictet onboard.

25X1A

Question: On the unstart itself, do you recall how high the nose was initially after you had established this 60 degree bank prior to you reaching forward with the stick?

25X1A

[redacted] It was, if anything, slightly low on the horizon. I would say we had almost a 1000 feet in rate of descent in this part of the turn. I remember seeing the Vertical Speed Indicator, which is not particularly accurate, and it was indicating approximately 1000 feet rate of descent just prior to this.

Question: Do you recall seeing a KEAS reading, max KEAS or max Mach at this time?

25X1A

[redacted] I do not recall seeing max KEAS. I do recall Mach just prior to this was 3.176. This was probably the last reading I remember looking at.

Question: Do you recall what, approximately what, the CIT reading was around this time?

25X1A

[redacted] They were running about 390 or 395.

Question: In your action during the unstart you reached for the restart switches. Had you at that time prior or afterwards made any movement on the throttles reducing it to Minburner or Mil power?

25X1A

[redacted] No, the first action was the stick trying to - It went up to the 60 degree bank and I merely reacted with the control and then reached over for the restarts and saw the CIP's and thought I'll hit both restarts instead of one. Then my attention was attracted to the excessive bank angle and the lack of responce to bank correction. And after that this is what preoccuppied me.

Question: Did you activate the restart switches?

25X1A

[redacted] I can't say. I think I did but I can't say. I remember thinking I'll hit them both and looking at the bank angle and think well at least its not 90 degrees like [redacted] had and I've got to get rid of that bank angle. Then the forward and full left aileron input and the nose started up. I think I hit the restart switches but I wouldn't swear to it. I know I thought to myself I had better hit both restarts. I was reaching over there but the whole thing happened so fast I can't say for sure.

25X1A

Question: During the unstart did you have any chance, opportunity to talk to Jim at all?

25X1A [redacted] None at all.

Question: You don't recall any attempt to actuate the bail out switch or anything like that?

25X1A [redacted] No I don't. There was no conscious attempt to actuate the ejection system.

Question: Coming down you said the faceplate was iced over did you have sufficient vision that you could tell that the stabilize chute was out?

25X1A [redacted] No I couldn't see that. I looked up for the stabilize chute and I couldn't see it. I could see some of the straps.

Question: Could you see the horizon?

25X1A [redacted] No I couldn't. I could tell that there was blue sky outside. It was very light but I couldn't see the horizon. The only thing I could see definitely were the straps coming up in front of the faceplate.

Question: Bill, will you clarify the Auto-Nav portion of the Autopilot that you were using. Were you flying the aircraft in pitch manually?

25X1A [redacted] Yes, I flew the aircraft in pitch manually throughout the entire flight. All I was using was making it roll, Auto-Nav.

Question: You did not use Mach Hold?

25X1A [redacted] I did not engage pitch Autopilot in the flight at all.

Question: The only Autopilots you had were Autopilot and roll.

25X1A [redacted] Roll and Auto-Nav, Yes Sir.

Question: When you made the control movement to recover from this angle do you recall either knocking your Autopilot switches off or (Interrupted by [redacted] 25X1A

25X1A [redacted] 25X1A

[redacted] No, I know I didn't knock the switch off. My hand was on the stick all the time. I can't tell you truthfully whether I disengaged it with the trigger. I don't recall consciously doing it.

Question: Did you use any rudder to compensate for the yaw and roll coupling?

25X1A

[redacted] I think so. I think I had rudder and full aileron and full left stick but this is all instintive reaction.

This is Colonel Daniels on the 27th of January. We're at the National Guard Armory with a preliminary partial meeting of the hearing board. Present are Colonel Fussell, Colonel Tempelton, [redacted] Major James, [redacted] 25X1A

25X1A [redacted] Lockheed.

This is a continuation of the questioning of [redacted] 25X1A

This is Colonel Daniels:

Question: Bill, would you describe this unstart and compare it to other unstarts you have had and its reference to its violence?

25X1A

[redacted] It was not any more violent than the normal unstart as far as noise and vibration. The primary difference was the fact that it put the aircraft almost immediately, from a 35 degree, into a 60 degree right bank. Then following that there was the lack of control response to the bank correction input. But the unstart itself was essentially a normal unstart.

Question: Bill, would you compare this pitch up to pitch ups you have seen in other aircraft?

25X1A

[redacted] I have not personally experienced pitch ups in other aircraft, but I have studied the pitch up spin history and tests of the 104, considerably, at great length and seen all of the films many, many times. The pitch rate involved here compares almost the same as the pitch rate I've seen from cockpit pictures of the 104, Pitch Up Spin Tests.

Question: Bill, what was the last angle of attack reading that you recall?

25X1A [redacted] It seems to me that it was approximately 3½ degrees. I recorded a lot of angle of attack readings throughout the flight but I believe the angle of attack reading I saw in conjunction with 2½ degree nose up pitch trim was 3½ degrees.

Question: Bill, what was the last number position do you recall on the forward door, right side?

25X1A [redacted] I was not consciously looking at the door position indication. I was attempting more to match CIP's manually with the forward door handle or knob. However, I believe in cruise prior to that time the door position was at approximately 10 on the indicator and then when I opened the door slightly at the initial part of the turn I believe the position was about 9 on the door at the time of the unstart, 9 to 9½.

Question: Bill, just prior to the unstart what was the approximate throttle position that you had?

25X1A [redacted] I would say a third burner.

Question: Bill, do you recall using the pitch trim in trying to correct for this pitch maneuver?

25X1A [redacted] No I do not recall consciously putting in pitch trim.

Question: Bill, were your shoulder harnesses locked?

25X1A [redacted] Yes, I'm positive my shoulder harnesses were locked. I locked them before takeoff and for the entire flight with the harnesses locked.

This is Colonel Tempelton:

Question: Bill, I wanted to get clarification on a couple of points you made earlier in the tape. You mentioned in the first leg where you had a forward c.g. that you were getting a little feedback in the stick during the turn. Would you clarify this a little bit?

25X1A [redacted] Yes Sir. When I was making these turns at the end of the NOAH route where I had maximum nose up pitch trim, a very heavy back stick force was required. When this aft stick input was made I experienced a pulsing feedback in the stick. The stick was pulsing lateraly, very slightly. At the time the aircraft appeared to be stable as far as roll attitude is concerned. The only unusual occurrance was the stick pulsing itself.

Question: The other point was - Earlier in the mission you had corrected the course although you were Auto-Nav. Did you disengage or did you override the Autopilot?

25X1A [redacted] No, I overrode the Autopilot to minimize the bank angle. Auto-Nav put the aircraft into approximately 40 degrees of bank in some of the turns we made on the first leg. I just took the roll out manually with the stick. Without disengaging the Autopilot. It brought the bank angle back to 35 degrees.

This is Colonel Daniels:

Question: Bill, do you recall making any rudder corrections during the unstart maneuver?

25X1A [redacted] No not consciously, I may have instinctively but I do not consciously recall any rudder input.

Question: Bill, how long had you been at speed prior to the unstart?

25X1A [redacted] I would say approximately 10 minutes.

This is Colonel Richardson:

Question: Bill, do you recall or can you state how you opened the faceplate after the main parachute deployed?

25X1A [redacted] Yes, I reached up with my left hand to actuate the unlatching knob and it felt like a perfectly normal unlatching and the rotation of the visor upward was surprisingly easy. I thought that I might have difficulty opening it. I expected to have difficulty, since it was all iced over but the opening appeared to be very easy to me.

Question: Bill, how soon after the main chute deployed did you open the faceplate and when I ask this question I'm speaking in terms of time, of course, and approximation?

25X1A

[redacted]: I would say within a minute after the main chute deployed. Probably 30 seconds.

Question: Bill, after you raised the visor on descent, did the visor remain up by itself. You didn't have to hold it?

25X1A

[redacted] Yes, the visor remained up on the parachute descent. I didn't have to hold it up.

Question: And then after parachute landing on the ground did you notice any difficulty with the visor then?

25X1A

[redacted]: Yes, after landing I noticed that I had to hold the visor up with my left hand while I was trying to unfasten the shoulder harness. The visor would not stay in the up position. And it was still iced over.

A TRUE TRANSCRIPT

Donald R. James

Donald R. James, Major, USAF
Board Recorder

BOARD MEETING - 1000 HOURS - 1 FEBRUARY 1966

25X1A

COLONEL FUSSELL [redacted] the sole purpose of the investigation is to determine all factors relating to the accident, incident and in the interest of accident prevention to preclude recurrence. The investigation will not be used as evidence or to obtain evidence or use in disciplinary action to determine pecuniary liability, or line of duty status, or to revoke commission or to support a demotion or to remove from the active duty list under the provisions of AFR 36-2, or for use before a flying evaluation board.

COLONEL FUSSELL During the course of the investigation the pilot, [redacted] made the statement that you had witnessed a pitch-up some time ago. Will you tell the board, in your own words, the circumstances surrounding that incident and the action taken by you, to recover. If possible, we would like for you to include elapsed times of the incident and the recovery, including speed, altitude, angle of bank and pitch, center-of-gravity, fuel aboard, etc..

25X1A

25X1A

[redacted] of the SR-71/F-12 Test Force. In response to the statement that I had experienced pitch-up in this aircraft, this is not a true statement. At no time in the YF-12 or the SR-71 have I experienced what I would consider pitch-up. I have experienced unstart conditions, which is the inlet unstart on both the YF-12 and SR-71, and, on these occasions, the aircraft does go into different conditions at that time, and I will go into some detail in describing exactly the conditons encountered in this particular aircraft - the same aircraft in which the accident occurred. First, however, I would like to state that the unstart conditions encountered in the YF-12A are not considered to be in the same ballpark, so to speak, or in the category as unstart conditions in the SR-71. There appears to be some basic difference in the stability of the aircraft or in the capability of the aircraft to stay in a right-side-up condition under inlet unstart than the similar condition encountered on the SR-71. With regard to the specific conditions encountered on the SR-71: On Flight 19 of this aircraft, on the 23rd of September, I took off and headed

north on course. Approximately 24 minutes after take-off I was on speed and climbing in altitude, maintaining full power on the aircraft. The automatic navigation system was operating properly in the aircraft and, shortly after take-off, the autopilot was engaged and the automatic navigation system was also engaged and, in this condition, the navigation system flies the aircraft through the autopilot. The plan was to maintain full power and to maintain a limit of 400° compressor inlet temperature. This had been a recently established limit that we would try to maintain and would vary with the ambient temperature at altitude. As far as our speed and altitude capability, these variables would depend on what you're able to attain while maintaining a limit of 400° compressor inlet temperature. While maintaining 400°. I reached a Mach number of 3.18 to 3.2 and was holding this condition at approximately 75,000 feet when the aircraft went into its first programmed turn. This turn was to the left. The aircraft went into a 40° bank, initially, to the left, and then slowly rolled back out to a 35° bank in about 2 or 3 seconds, possibly 4 seconds, and then, in another 4 or 5 seconds, rolled out to a stabilized 30° bank. Approximately 3 1/2 to 4 minutes into this turn, the nose of the aircraft started down slightly and, since both pitch and roll attitude to hold were being used, as far as maintaining the attitude of the aircraft, the pitch trim knob was moved in the "NOSE UP" direction in order to keep the compressor inlet temperature at 400° and, at the same time, reduce the Mach number to effect maintaining this limit. The Mach number reached 3.22 by the time this NOSE UP correction was made. The first correction was put in at 3.21 Mach number and didn't have quite the desired effect and another small beep trim - NOSE UP trim - was put in to hold the speed and temperature as desired. Just as the Mach number reached 3.23 and the nose was coming up slightly, the left engine unstarted. At this time, my right hand was on the autopilot control and my left hand was near the control stick. Simultaneously, with the unstart, the aircraft started a roll to the left. Already being in a stabilized 30° bank, the aircraft went into a continued roll in that direction - to the left. The control stick was moved to the right with my left hand while taking my right hand off of the autopilot control and grabbing the control stick and moving, forcing the control stick,

to the full right position. At this time, the nose of the aircraft was approximately on the horizon. Even though the stick had been moved all the way to the right, and the bank angle had reached 45 or 50 degrees, which should disengage the autopilot automatically, the autopilot disconnect switch trigger was actuated on the control column and the aircraft continued to roll to the left. My left hand was moved from the control column to the throttle and power reduced to minimum afterburner since I felt that the right engine, the right inlet, being still in a starting condition, the power on that side was actually rolling the aircraft, tending to roll the aircraft over on its back. The power was reduced to minimum afterburner on both throttles even though the left engine, the left inlet, was unstarted. This was verified by rapid check of the compressor inlet pressure gauge. The reading on that gauge was in the vicinity of 5 psi, which was quite different from the right engine, which was reading in the order of 15 or 16. The aircraft was continuing to roll to the left and full aileron appeared not to have much effect in the rate of roll. The rate possibly slowed down slightly but it was still going up. As soon as I noticed that this combination of reducing power and full right aileron was not having the desired effect, I started feeding in right rudder. Having quite a bit of previous experience in delta wing aircraft, it comes as almost second nature to effect use of the rudder for roll if the aileron is not having the desired effect. By feeding in full right rudder, the rate of roll slowed down and the aircraft stopped rolling to the left when the bank angle reached approximately 90°. At that time, I believe, was the first time that I felt that I had the aircraft back under control. Until that time, this was the first time in one of these aircraft that I felt that, possibly, it was getting away from me. I definitely had the feeling, when I went through about 60 or 70 degrees of banks, that there was a very strong possibility that I might roll over on my back, and I didn't particularly want to be on my back at 3.22 Mach number at 76,000 feet. Once the bank angle peaked out at about 90°, the aircraft started righting itself normally; the nose had no tendency to go up or down and the bank angle was reduced to about 10 or 15 degrees and the right correction - the left restart switch had already been actuated.

The roughness encountered connected with the inlet was reduced and the restart switch was placed in the normal position. The compressor inlet pressure built up normally and there was no over-temp of the engines, the EGT stayed within the normal range and it was not even necessary to get an afterburner relight. The inlet restarted, the compressor inlet pressure came back up, the aircraft was placed in approximately 20 or 30° bank to the left, the autopilot was re-engaged and the automatic navigation mode was re-engaged and a small direct turn correction was necessary to get back on course. This entire operation required less than one minute.

25X1A

COLONEL FUSSELL [redacted] do you feel that you had sufficient control to maintain straight-and-level flight or to regain straight-and-level flight with the power you had initially when you encountered this roll tendency? In other words, had you not reduced power, do you feel you would have had sufficient control to hold the aircraft?

25X1A [redacted]

I feel that had I not reduced power that with full rudder the aircraft possibly would have rolled back in the same direction that I had started out from. In other words, I feel that, even though I had not reduced power, the rudder was the primary factor that got the aircraft right-side-up again. This is just a feeling - I have no way of knowing this - it is possible that had I not reduced the power and that the right inlet had stayed in a normal condition - in other words - had not unstarted, that the aircraft might possibly have gone to a higher angle of bank. I do feel, though, that, even with this differential in power, the rudder was effective enough to bring the aircraft back to a level flight condition. I have no way of knowing this without trying it. On this same flight, near the end of the flight, I encountered this same condition at 84,500 feet and went through almost the same maneuvers - I had to use full right rudder to right the aircraft, but, in this instance, the right inlet also unstarted as I was recovering and the right EGT went overboard and I had to shut the right engine down in order to keep the engine from cooking in just a few seconds - and I can go through that maneuver also if you're interested; however, it was almost a repeat of the lower altitude maneuver - it was just at a higher altitude with about the same speed Mach number conditions, much lower equivalent airspeed conditions.

COLONEL FUSSELL — Can you tell the board what your approximate center-of-gravity was during this maneuver?

[redacted] 25X1A — I don't recall exactly what the center-of-gravity was at this condition. I don't recall, without looking at some more data from that flight, exactly what my pitch trim condition was going into the turn or what my total fuel remaining was, but this information is available from the records of that flight. I just don't recall it off-hand. I didn't make a note of it before I came in.

COLONEL FUSSELL — Discussion with other pilots in the SR-71 indicates that it takes rapid reaction on the part of the pilot to prevent loss of control. Could you give us an estimate of that time? I understand that you probably are high time man in this airplane, but, for a less-qualified individual, what would his reactions be to this same condition? This entire experience took approximately one minute; let's say you had much less experience, what would your reactions be?

25X1A [redacted] — It's a little bit hard to estimate. I feel that there's a good possibility the reaction time would have been slightly less and, as you stated, any comment that other qualified people made with regard to reaction time can't be over-emphasized as far as I'm concerned. This reaction time is very important once you see the aircraft assuming some altitude that you are either not expecting or would rather not see - the importance of a quick reaction time cannot be over-emphasized for this reason. At these altitudes and speeds, the response of the aircraft to the deflection of the controls is relatively slow - by this I mean it is quite a bit slower under the same conditions, equivalent airspeed-wise, at a lower altitude or subsonic condition. So, since there is a noticeable delay in the response of the aircraft to the control deflection, it's very important to make a correction as quickly as possible and hold the required deflection until the aircraft assumes the attitude that you desire. As far as a less-qualified pilot - this probably would depend whether he was on his first, second or third ride, or if he had maybe had 10 or 15 rides and whether or not he had encountered some unstart condition or some emergency condition that would require relatively rapid reaction; but it's conceivable

that an inexperienced pilot, relatively inexperienced pilot, particularly someone who didn't have a large amount or reasonable amount of delta wing experience, would not feel it was a normal reaction to use the rudder to either recover from a roll condition in the aircraft or to actually effect a roll in the event that the ailerons were ineffective. I think that it's a combination of the reaction time and knowing what controls actually are helpful under these conditions in order to keep the aircraft in the desired attitude.

25X1A

COLONEL FUSSELL

[redacted], do you consider unstart in this aircraft as a fairly common occurrence?

25X1A

[redacted]

In the early development stages we experienced quite a few - a large - much larger number of unstarts, I should say, than we have experienced with the improved inlet and bypass door controls - spike and bypass door controls. The unstarts were relatively common in the early stages of the interceptor and are still encountered, I think, to a higher degree because of these earlier controls than we are experiencing with the SR-71. So I feel - I actually have had very few unstarts in the SR-71, but by the same token the unstarts that I have encountered with the SR-71 have given me a different feeling about the aircraft than with the YF-12. I would like to make this statement with regard to the situation that was encountered on [redacted] 25X1A

25X1A [redacted] flight. I don't recall any time in the YF-12 or the SR-71 that I had the feeling that the aircraft was, no matter what the emergnecy was, particularly in an unstart emergency, I don't feel I ever came across a situation where I had the feeling the aircraft was getting away from me longitudinally. The closest I came to this was an unstart in the interceptor at one time when the nose of the aircraft when I was diverted in the aircraft for as long as 5 or 10 seconds and the nose of the aircraft got down lower than I would have desired to see it go down, and I was still in a 45 or 55 degree bank. At this time, I immediately rolled the aircraft to a level condition and pulled all the way back on the control column, however, the response of the aircraft under these conditions was slow enough that the equivalent airspeed limit was exceeded by some 30 or 35 knots while the recovery was being effected. This proved to me, very quickly, that the longitudinal or pitch

condition of the aircraft is going to have to be monitored relatively closely by the pilot at all times and I have stressed this with all of the pilots not to let their nose get down or up to any great extent at these high altitudes and high speeds because of the relatively slow response of the aircraft to a controlled deflection for recovery.

25X1A

COLONEL FUSSELL

[redacted], as an experienced pilot, what control reaction do you normally apply during an unstart?

25X1A

[redacted]

Well, I think, whether consciously or unconsciously, of primary importance is maintaining the proper pitch attitude of the aircraft - the movement of the controls in a very rapid fashion to keep the nose relatively on the horizon or in a situation where you want to make sure that it's not going either down or up to any great extent that it might get you into trouble. This is probably something positive that could come out of this that what has happened is that we may probably have to increase our emphasis on maintaining the longitudinal, proper longitudinal attitude of the aircraft first and then taking care of any other things that are going wrong after that. I guess - I probably was fortunate in my first bad unstarts on the down side engine in the aircraft in that my nose was either slightly down or at least on the horizon when these were encountered and I felt that my problem was entirely in roll and didn't even have the feeling that anything was going wrong longitudinally. I had no tendency of the aircraft to pitch up and the feeling was never there that the airplane was getting away from me longitudinally, but it sure did feel like it was getting away from me in roll.

COLONEL FUSSELL

Could I summarize by saying that high altitude, high Mach, possibly CG a little aft, that when a pilot witnesses an unstart that he has definitely an unstable aircraft on his hands?

25X1A

[redacted]

Well, he's got a situation that he has to take immediate corrective action on - there's no time to check a checklist or to think a little while about what's going on and take the action later. The corrective action has to be taken immediately, particularly in pitch, and also in roll, to correct this situation. The

stability augmentation system normally takes care of any excessive Yawing condition you get with this, but I think there are a lot of things we don't know about the coupling condition of the slight Yaw plus the roll condition in the aircraft and that even though the stability augmentation system is helping the pilot, the pilot also has to help it by using what rudder is required and, particularly, longitudinal control to maintain the aircraft in a level or slightly nose down condition.

25X1A

25X1A

[redacted] in the early part of your discussion, answering your question from COLONEL FUSSELL, you stated that inexperienced pilots would have less reaction time - I think you meant "more" reaction time. Is that right?

Correct. The reaction time would be slower on the part of the inexperienced pilot.

Okay. Now, to your knowledge, did other pilots experience at a seemingly roll instability or pitch instability?

Other pilots of the SR-71?

Yes, in this aircraft.

I've discussed whis with a couple of the contractor pilots and I believe one or two of them have experienced some roll difficulty in an unstart condition, but possibly not quite as severe as the roll that I experienced on my unstart. These pilots, as well as I recall, were [redacted]

25X1A

And were all of these experiences associated with the unstart condition or is that entirely necessary?

The only conditions that I have described are connected with the unstart conditions. The other pilots will have to speak for themselves and the only one I recall that was not an unstart was one that LT COLONEL DANIEL had that was where he was also using the autopilot and was in a bank and a malfunction in either the autopilot or the stability augmentation system caused the aircraft to go into increased bank - increasing bank in a direction that he was already turning and I think those specific conditions can probably better be recalled by LT COLONEL DANIEL than myself.

25X1A

[redacted]

Now, to your knowledge, were there any rumors during the previous time period that the aircraft, in certain phases of flight, had unstable characteristics?

No, not unstable characteristics, per se. We have had many discussions between the military and contractor pilots flying this aircraft with regard to the feel of the aircraft and its stability augmentation system under a variety of CG conditions and the pilot that has had more experience with this and actually more experience in the SR-71 than any other pilot is the primary contractor pilot for the aircraft, [redacted] He flew the aircraft 25X1A
with the CG furtherest aft and made turns initially. I believe since that time other contractor pilots have flown the aircraft with the aft CG - I believe one of these pilots [redacted] 25X1A
. The only comment made by MR [redacted]er the initial condition was that the aircraft felt like it had a slightly aft CG and that he felt that he should transfer a little bit of fuel forward so that it would fly - feel a little bit better. However, at that time, that particular aircraft had the preliminary or the non-standard stability augmentation system and there were some changes made in the gains and improvements made in the production stability augmentation system of the aircraft and the comments of the nature that the airplane felt like it had an aft CG sort of went away once we got the production stability augmentation system. I don't recall any comments by any of the pilots that they felt like the aircraft gave them a feeling that it was real unstable.

Now, during the unstart, you made the comment that a pilot has to be pretty quick on his reactions with his controls and to select the proper control to use to get up out of the difficulty; but aren't you very busy in the cockpit during this unstart and doing everything else so that a less-experienced pilot could have difficulty and let, perhaps, the aircraft get away?

Well, I have great hopes that our training program will be such that a pilot won't be able to get the aircraft to these speeds and altitudes under these conditions until he has a degree of proficiency that it would allow him to take these corrective actions immediately

once he had some difficulty. We have a Simulator that can simulate these emergencies and we have the trainer that is available and I feel that the pilots that get out to these speeds and altitudes are going to have to have these procedures down cold, namely, get the aircraft under control, attitude-wise first, and take care of your unstart or whatever your emergency is after that. Next, without referring to a checklist or to the systems operator to read something to him or consulting with him and all this. These things have to be practiced and memorized so that they come as an immediate reaction to any emergency. You don't have time - you don't have B-52 and B-47 times to take care of these things. They have to be done in a little bit quicker fashion than that.

25X1A

25X1A

[redacted]

In your estimation of [redacted] would you say that he was an above-normal pilot with regard to quick reactions?

My estimation of [redacted] 25X1A nd his capability is that he's a very highly-qualified pilot. He had much experience in the F-104 and he's young enough and he's in good physical condition and he's alert and I have a relatively high estimation of [redacted] 25X1A and his capability. I certainly feel that his reactions are fast enough and he knows the aircraft well enough to take care of emergencies that come up. [redacted] 25X1A has had some relatively serious emergencies in this aircraft and he has taken care of them, in what I would consider, a pretty good fashion.

Could you give any explanation, at this time, of how the aircraft presumably got away in a pitch attitude?

Well, this would be mostly speculation on my part, but in studying what could have happened in this particular condition, [redacted] 25X1A flight conditions differed from mine in that he was flying the aircraft longitudinally without the aid of the autopilot, I should say. In other words, he had roll hold and automatic navigation engaged to keep him on the automatic navigation track, but he was controlling the longitudinal attitude of the aircraft with the control stick. If, by chance, as he went into the turn, he got diverted checking into the cockpit and this sort of thing and not paying extremely close attention to the

longitudinal attitude of the aircraft, in other words, if his nose started up or down without him noticing it particularly, there is a possibility that he could have been a little late, shall we say, in correcting this longitudinal attitude, until it was a little bit too late. Now, by this, I mean - just by being diverted one way or the other looks like there is a possibility that the longitudinal axis, particularly if you are in a 30 to 60 degree bank you don't really have a good reference to the horizon and you have to depend on your instruments in the cockpit to some degree but I like to use a combination of the attitude instruments in the aircraft and also the horizon, if it's available, but it's conceivable depending on what he was using as a reference that he could have let the longitudinal attitude of the aircraft get away from him just long enough to create a situation where full deflection of the controls would not have corrected this attitude to the full deflection of the controls is a little bit slow at these altitudes and speeds.

25X1A

[redacted]

In your estimation, [redacted] do you think in order to avoid a situation like this from recurring that some corrective design - some action - should be taken on the aircraft?

25X1A

Well, I don't have any specific recommendations at this time. I think we may find out that we will be better off with some very definite, specific instructions to the pilot in maintaining the proper pitch attitude. I would like to see investigated after the difficulty I had and the fact that I had to use rudder to keep the aircraft up right, I would like to see investigated the affect or the possibility of removing the control surface limiter once we're above a certain altitude and speed condition. Now, I think a study of this should be made if it hasn't already to see what this will do for us as far as giving the pilot a little bit more control surface deflection to affect any sudden attitude change in the aircraft. I think we should possibly study the longitudinal situation of the aircraft a little more carefully with regard to the proper CG that should be maintained, but outside of that I don't have any at this time.

25X1A [redacted]

Thank you very much Colonel.

LT COLONEL DANIEL

I'd first like to have into the record that we will make an effort to obtain the instrumented and data from [redacted] flights 25X1A which should include the pitch rates and attitude which will be made part of the record. 25X1A [redacted], would you say that the primary concern of the pilots up to this point in high speed flight has been one of a directional stability rather than pitch up to this point; primarily we have been concerned with loosing the airplane directionally.

25X1A [redacted]

I'd say that is correct - a combination of directional and lateral stability in that and the lateral control system. I believe the worst condition encountered laterally was possibly my condition at least as far as bank angle with a possibility that [redacted] 25X1A may have experienced a fairly close to the same bank angle with an unstart, but I have to agree that I believe of all of the test pilots that have been flying this aircraft have sort of had the feeling with the engines displaced from the fuselage, the distance that they are and knowing the situation when you suddenly lose one of these engines or the effective one, which is the same thing if you lose an inlet, an unstarted inlet, that our primary concern has been directional rather than longitudinally, and this is including a flight on the interceptor where the test pilot, [redacted], flew the aircraft 25X1A with a CG about on the aft limit or slightly after the aft limit for that matter. He felt that he had a relatively unstable aircraft longitudinally on that flight and maybe we're fortunate that he didn't have an unstart, but his only comment was he felt that his CG was a little bit aft of normal because he could feel the difference longitudinally, but he didn't feel it - at that time even then he didn't say he felt it was unsafe.

25X1A

LT COLONEL DANIEL

[redacted] would you confirm that, when the SAS is properly operating, the stability in all axes, as far as what the pilot feels, is normally quite good.

25X1A [redacted]

Yes, I'd verify that 100%. The general feeling among all pilots that have flown this aircraft is that the SAS system is one of the best and

most reliable systems in the aircraft and that it is a great aid to the pilot in flying the aircraft, in maintaining the proper attitude and flight conditions. The stability augmentation systems acts as a damping device for rapid movement of the controls and it acts as a - the biggest help is that in an unstart condition the rudder is fed in in the proper directions so fast that there have been many occasions that the pilot initially made the statement that a certain engine had been unstarted, an inlet had unstarted and it turned out to be the wrong one. We've had this on many occasions.

LT COLONEL DANIEL — Sir, then would you confirm that the SAS does mask any instability of the plane under the normal flight regimes and it's only when you get an unusual condition where the slow control response enters into it that the pilot, himself, would then report on a bad handling airplane?

25X1A [redacted] — Absolutely. The SAS is so effective that it does mask any unstable characteristics of the aircraft that would normally be noted by the pilot. This is one of the things that I feel we get into at this state of our development is that we become more and more dependent on artificial stability devices rather than the inherent stability of the airframe of the vehicle itself.

25X1A

COLONEL TEMPLETON — [redacted] would you clarify a point on the unstarts you were describing with particular regard to the second unstart? Did you find it necessary to reduce power on the good engine and add rudder in the higher altitude unstart?

25X1A [redacted] — Yes, and I'd also like to add a few more comments about that second unstart. To describe the conditions again, I was at 84,500, Mach number was 3.17, the aircraft automatic navigation system rolled it into a 35 - 40 degree bank and then back to a stabilized 30° bank. I was about half-way through that turn, or approximately 2 minutes and the left engine unstarted again. I went through the same maneuver only I feel that my reaction time was a little bit quicker because I was more or less expecting it after the first occasion and even though I again had to move my hand over to the

stick and so forth, I did reduce power and feed rudder in at the same time and also pushed the nose down under these conditions because I noticed that the right EGT was going overboard and so I had to shut that engine off completely and the left EGT was up high enough, over 820 - 830°, that I reduced that engine to less than military power. With this power reduction and the fact that I started slowing up very quickly, the immediate reaction was as the aircraft was righted laterally, in other words, as I got the right wing back down, I also pushed forward on the stick to get the nose down to keep my speed up and at the same time hit the restart switches which gave me more drag and caused me to push my nose down even further. This was a buffeting situation and the aircraft went through a lot of buffeting until I got to a speed of about 2.2 or 2.1 Mach number at which time the inlets were restarted and things smoothed out a little bit; but primary concern again was reducing the power on the good side and getting the right rudder in but this was not quite as important as the other time even though I was at higher altitude because I had to shut the right engine off because it unstarted also whereas on my first addition the right inlet never did unstart.

25X1A

LT COLONEL ROTHWELL [redacted] could you comment on the use of the autopilot pitch trim knob in this aircraft which forces you to transfer your normal right hand stick position to flying the aircraft with your left hand so that you will have to switch hands to get back to the throttle. How often do you fly in this condition and its effect on recovery from an unstart under these conditions?

25X1A

[redacted]

In the design concept in the way this autopilot was supposed to be used, it was hoped that the requirement for the pilot to keep his right hand on the autopilot control would be minimized through the use of a Mach hold mode. However, at this stage of development the mach hold mode is not functioning well enough to be used normally or to be kept engaged for any length of time without the aircraft going into a long period longitudinal oscillation that is disturbing to the pilot and gives him the feeling that he could fly much better manually or using the pitch

attitude hold and using the pitch control knob on the autopilot. Now, in your comment with regard to the requirement to keep the hand off the control column is very important because, I know myself and I believe the other pilots agree, that one thing they don't want to do flying at Mach 3 at these altitudes is to take their right hand off of the control stick because you like to have it there to be ready to put any input in to either overpower the autopilot or to disengage it and put your own control in manually. So, I feel it's very important that if we're going to be continuing to be required to use the longitudinal trim on the autopilot as a primary means of maintaining the desired longitudinal attitude that the autopilot should be modified to allow this trim function to be performed while keeping the right hand on the control column. This can be done - it's been done with autopilots similar to this one and it can be done through control stick steering of the autopilot or putting the longitudinal trim in some location on the control head similar to the way it is done in other aircraft. I might mention that we had complained about this deficiency to the prime contractor and to the associate subcontractor who builds the stability augmentation system and the autopilot and a study has been underway for some time to, not only improve the Mach hold mode, but to see what would be required to make a change in the autopilot system that would allow the pilot to keep his right hand on the control stick.

LT COLONEL ROTHWELL

Going to another system, Sir, the knowledge by a pilot of his actual CG position as I understand it now, is generally taken from the pitch trim position. Could you comment on the adequacy of this and how accurate the knowledge is to you and whether you have additional thoughts on this subject give you better information to, considering we do have apparently a longitudinal stability problem the effect this lack of accurate knowledge might have.

25X1A

[redacted]

This is correct. The normal indication to the pilot of his relative CG position is, by observation, of the pitch trim control. Considering the fact that this trim indication might have some inaccuracies and also considering the fact that any longitudinal instability could be apparently well masked by the stability

augmentation system, it would be desirable for the pilot to have some more positive indication of what his longitudinal CG is. However, I feel that the CG could be in range of possibly 3 or 4% near the aft limit and the aircraft could still - there is a possibility from looking at the stability curve - that the aircraft could get into trouble by the laxity on the part of the pilot in not maintaining the proper pitch attitude in level flight as well as in accelerated flight.

LT COLONEL ROTHWELL — Do you feel that your capability in this aircraft to move fuel to get or to establish a desired CG give you adequate control over the system?

25X1A [redacted]

I feel that it is satisfactory at the present time to keep the CG at a desired forward location. By that, if the CG, under some flight condition, is more aft than desired, fuel can be transferred forward and a rough indication of the change can be determined by the change in the pitch trim required to hold the aircraft in level flight. Where I feel a more sophisticated system would help would be the capability of possibly getting a more aft CG than is being maintained for the high speed cruise part of the flight so that minimum trim drag could be maintained. This should be a part of the study that is made on the overall CG position and possible change in the attitude on the part of the nose section of the aircraft.

25X1A

LT COLONEL ROTHWELL — [redacted] going back to your unstart condition where you got into your severe bank, had this been at night, is the instrumentation in the aircraft adequate for an average pilot to be able to recover with or - could you recover as well - as easily at night as you could in the daytime?

25X1A [redacted]

Well, I think it goes without saying that any night or weather condition would amplify the seriousness of the attitude control situation. I will say this, that the pilot spends an awful lot of time looking at the instruments in the cockpit on these flights as opposed to looking out at what's left of the horizon, so to speak, and that the instrumentation in the aircraft is as good as comparable aircraft, I feel that fly at least up to Mach 2 and what few aircraft fly up into this regime. At night,

I feel that I probably still would have taken somewhat the same corrective action, hopefully with the same reaction time involved, but I think all pilots would be the first to admit that at night in weather it's not going to be quite the same as it would be under VFR conditions as far as recovering the aircraft to an upright condition.

LT COLONEL ROTHWELL — You do feel that you are relying considerably on your instrumentation in daylight recovery and things were adequate?

25X1A

[redacted] — I feel that in this aircraft we're relying more on the instrumentation in the aircraft than you would for other aircraft with less performance because we can't see our wings - we're sitting out in almost our own little environment, we're at a pretty high altitude and many times there's an undercast and we don't really have a good true picture of the horizon anyway, so I believe the other pilots will agree that we spend more time looking at the attitude instruments in the aircraft during VFR conditions than you would at lower altitudes and lower speeds.

LT COLONEL ROTHWELL — Sir, switching subject again, what is your requirement as Test Force Director in regards to control and monitor of the Lockheed - the company pilots - as regards to their checking of proficiency checks, instrument checks - where do you stand in this area monitoring their quality?

25X1A

[redacted] — We stand in this area as advisors to the System Program Director, COLONEL TEMPLETON, since he is performing the function of the AF Plant Representative or the normal AFLC function and we feel that he relies on our background and knowledge of these pilots to keep him advised with regard to what our feelings are about their qualifications, etc.. Any time that we may notice that maybe one pilot hasn't been flying very often or might appear to be what would normally be considered uncurrent or non-proficient, our course of action is to report this to COLONEL TEMPLETON and he discusses it with the contractor.

COLONEL FUSSELL — Do you have any further comments concerning your previous incidents that you might add at this time?

SECRET
SPECIAL HANDLING REQUIRED

25X1A

[redacted]

Just one short comment. As a result of what I encountered on my flight, we made the recommendation to all pilots that bank angles be restricted to no more than 30° when flying the aircraft at 80,000 feet or above. This had been somewhat of a common practice among the pilots but we hand't done an extreme amount of flying above 80,000 feet so we made this recommendation firm as a result of my flight. Also because of the engine difficulty that I had, we restricted flights to 75,000 feet unless the derichment modification was made to the aircraft and to the engines and this is a system to protect the engines from over-temperature in the event of an unstart at these extreme altitude conditions.

A TRUE COPY

Donald R. James
DONALD R JAMES
Major, USAF
Recorder

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BOARD MEETING, 1100 HOURS, 1 FEBRUARY 1966

25X1A

COLONEL FUSSELL [redacted] as President of the board I will explain AFR 127-4, paragraph 16. "That the sole purpose of the investigation is to determine all factors relating to the accident and, in the interest of accident prevention, to preclude recurrence. The investigation will not be used as evidence, or to obtain evidence for use in disciplinary action, to determine pecuniary liability or line of duty status, or to revoke commission, or to support a demotion or to remove from the active list under the provisions of AFR 36-2, or for use before a flying evaluation board."

There are indications from various pilots in the SR-71 that unstarts are relatively common in the aircraft. The ensuing moments following an unstart require considerable skill and rapid reaction to prevent loss of lateral control. Will you tell the board of your experience in the aircraft, whether or not you have ever had experience of loss of lateral or pitch control and what actions you took to prevent or recover from the loss of control.

25X1A

[redacted]

I am [redacted]. I am a Lockheed engineering 25X1A

[redacted] 25X1A

any of my remarks here by the experience I have had in this area on the SR-71. To date, on the two sensor test aircraft, #2002 and #2003, I have flown ten flights in each aircraft. I have flown one flight in aircraft #2009. One flight in #2001. I rode as the back seat pilot in #2008. Of all the flights I've had in #2002, which is ten flights, eight of these flights were high and hot, and on every flight where I was high and hot I experienced unstarts. The only flights in this machine where I did not experience unstarts were two shirtsleeve flights, or low altitude, and slow. On #2003, I flew a total of ten flights. On this, on six of the ten flights, I experienced unstarts. Again, these were all in a condition of high and hot. I believe, with the exception of only one flight, all unstarts occurred above 2.6 Mach number. The bulk of them were at 3.2 Mach number. Sir, would you now direct your specific questions?

COLONEL FUSSELL Would you indicate what actions you took upon experiencing an unstart? And also, relate whether or not you were in straight and level flight, in a bank, what degree of bank, etc.?

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25X1A

[redacted]

Well, Sir, I've experienced unstarts in the aircraft from entirely straight and level flight in a 1g situation, up to and probably including a 45° bank in both directions. I would have to give you a qualified answer in that generally, when we were reaching our cruise point, which was anywhere from 3.1 to 3.2 Mach number - in a case like this, when we got an unstart it was generally, the action taken as I look back on it now is directly related to the position of the center-of-gravity of the aircraft. In most cases it required aileron in the direction to stop any ensuing roll that occurred, and generally there was a roll, especially in a bank situation. I've never had any excessive rolls, that I've heard reported - maybe 10 to 15° over and above what I had. But in practically all cases I had to apply forward stick almost simultaneously with the aileron control. The extreme case that I can bring to mind, I believe, occurred on Flight 41 in #2002 when the right engine unstarted. This was somewhere in the area of Bakersfield, and I required almost full forward stick and left aileron. I also had numerous unstarts in the same place where this accident occurred, rolling into the turn in aircraft #2003, and this was Flight 21 in #2003. At that time, [redacted] was with me. And again, I would say that the recovery technique was the same - it required roll correction immediately and forward stick.

25X1A

25X1A

COLONEL FUSSELL

Okay, [redacted] could you tell the board in any way or generally when you had an unstart, what your center-of-gravity was?

25X1A

[redacted]

Sir, Center-of-gravity cannot be related directly to any given unstart. I don't feel that center-of-gravity was ever a contributing factor. However, in the straight and level position, I would, to make a general statement, I would say it ran anywhere from 2 to 5° up elevon trim position. This is the only indication we have that is indicative of center-of-gravity position. If we were in a turn, and generally all turns in these two vehicles are made in automatic nav, the elevator pitch trim position was generally running from 5 to, in some cases, as much as 8° up, but again, this would depend on how long you had been in the turn, and the effect of the trim follow-up from the auto-pilot.

COLONEL FUSSELL

Could you tell the board what degree of rudder you used? Is this a coordinated maneuver, or do you depend on the SAS, or, in your own description, how do you control the aircraft during an unstart?

25X1A

[redacted]

The first reaction, I think of almost everyone is to use almost full opposite rudder. It's one of those things, you don't have to think, you do it instinctively. If the right inlet unstarts, the aircraft yaws to the right and you end up with full left rudder - generally speaking almost full left rudder, which in the limited case is 10°.

25X1A

[redacted] did you ever feel that the aircraft was going to get away from you in your experiences?

Well, Sir, I wouldn't say that I ever felt that there was a situation where I didn't have control of it. I have been to the point where I was very happy that it didn't go any farther than it did.

Then you were a bit concerned in some of these instances?

The one particular one, Yes, Sir, on aircraft #2002. I wouldn't say I was unduly concerned, but I was concerned that it did require as much control as it did to recover from it.

And was this concern of control in roll and pitch, or -

Roll, pitch, and yaw.

All three axis?

That's correct, because my own personal recovery technique is to get the aircraft in straight and level, lg configuration, as quickly as possible.

Do you think a less experienced pilot than you would have been in difficulty and maybe let the airplane get away?

Sir, I think that's a real intangible.

Just a guess. This airplane is going to be flown by pilots of lesser experience.

I think in some cases, possibly this could be stated, Yes - that a lesser experienced person might have gotten himself in trouble.

Do you think that if the aircraft is not modified in one or more respects, that it could be released for general flying, say for SAC personnel?

25X1A

[redacted]

Would you explain your term, modification, Sir?

Modifications to improve stability characteristics?

Well, again, are you talking about movement of C.G., or limiting controls, SAS authority? Would you be a little more specific?

All items. Any kind of an item to improve what is perhaps difficulty with the aircraft now in stability.

My own personal feeling is that if the C.G. is moved forward I think the aircraft is very satisfactory the way it is.

Then you think there should be some kind of automatic limitation, or C.G. position, or what?

Would you elaborate on the term "automatic"?

That you could not arrange fuel, or disposable items in such a position that you could get a rearward C.G. that would be detrimental to the, upset the stability characteristics.

Well, Sir, to begin with, I'm not particularly in favor of automatic C.G. systems. I had a good deal of experience in flying the B-58 with this. Even though I personally didn't have this problem with the B-58, it was of a great deal of concern at all times, and as you know, that particular machine had C.G. problems which resulted in the loss of some of them. This has been one of the nice things about our machine, the SR-71, the YF-12 and other machines - is the fact that it has been able to go along without all of this monitoring. I feel that the tanks can be scheduled in such a manner that it can solve this problem. Now, I don't think that we're going to be able to come up with any kind of a situation to where if someone works at it, they can't get this machine in trouble. I believe that if one starts punching on tanks and this sort of thing that it's very definitely possible to get in trouble, and I think the only way out of this is the training of the personnel involved.

Now, were there any kind of rumors or talk among the pilots about unstable characteristics at a certain realm of flight? At a high Mach, or high altitude?

No Sir, to my knowledge, there was not. We knew at the time that we were flying near our Aft limit. There has been no secret about this. But to my knowledge there has been no talk - at least not in my presence of anything like this.

25X1A

[redacted]

Do you have knowledge of other pilots experiencing uncontrollable, or near uncontrollable, situations?

No Sir, I do not.

You're only talking about your own definite experiences?

Any comments I have are relative only to my own experience.

25X1A

Then you didn't hear about [redacted] difficulty?

Well, I did hear about it - that he had one where he had rolled up to a fairly excessive angle of bank. That's about all I knew of that particular situation.

Then his particular experience was not advertised throughout the ---

25X1A

Yes it was. I don't know by what means it was advertised, but I do know for a fact that [redacted] at the time this accident, his was occurring, when he applied aileron control, he thought, "I must be in the same situation that [redacted] was in".

25X1A

Then you did know of the difficulty of [redacted]

25X1A

[redacted]

25X1A

Yes, I guess you could say if it was a difficulty. I didn't know the full circumstances that surrounded this, though.

25X1A

COLONEL DANIEL

[redacted] would you describe your feel for the flight control as the aircraft responds to an input which you make to overcome a pitch or yaw or roll rate which has been generated?

25X1A

[redacted]

I feel that all cases that I have personally come into contact with in the matter of unstarts, that the quicker the control is applied, the better. And at no time have I run into a situation where I didn't get immediate response. I feel that had I let it go longer, without applying the control, there is a question of doubt in my mind, and its one that I have no way of knowing what the response would be when the control was applied.

COLONEL DANIEL

Would you say, then, that possibly the control response is in the marginal area, where if a pilot let, say for instance, pitch rate generate, and wait a small time lag, that it might not be sufficient to control the aircraft?

25X1A [redacted]

Well, this again falls into a category of an intangible. I can't give you a black and white answer on this. I know that the stability augmentation system, for example, in pitch, is 6 1/2°, and I've been told before, and this was in the case of the YF-12 where we had a flight where we got a very, very rear C.G. and this was where we were practicing for the world's speed records here, that had we got into an aero-dynamics situation, the aero people didn't feel that I would have been able to respond fast enough. However, this was a condition of a very, very extreme C.G. condition.

COLONEL DANIEL — As you have said, most of the unstarts you have had in the SR-71 occurred in the auto-nav mode. Is it your habit to have both pitch and roll on attitude hold, or do you fly, for instance, pitch, manually?

25X1A [redacted]

In order to make it a true test, I use as much of it as possible. Whenever requested, I have even tried the Mach Hold, and I have not had a successful flight with that; however, to be specific on your question, I do use the Pitch Hold, and I do use the Roll Hold.

COLONEL DANIEL — JIM, what is your opinion in this mode when you have an unstart, of having your hand off the control stick. Has this presented a problem?

25X1A [redacted]

No, because I generally fly with my hands on my knees nearby, and it's an automatic reaction to go for the stick and the trigger at the same time to disengage it. It has never presented a problem.

COLONEL DANIEL — When recovering from an unstart, do you normally reduce power immediately?

25X1A [redacted]

No, I do not, because the main thing is to get the aircraft in straight-and-level flight and into a 1g configuration. One of the reasons that I don't pull the power of the remaining good engine out of Afterburner, since I've been flying this machine, which is 3 1/2 years, is that I've never had an occasion that I didn't know which engine unstarted. If you take both engines out of Afterburner, or your remaining good engine out of Afterburner and you're at design speed and altitude, no matter how quick you are, it's going to cost you 10,000 feet of altitude.

COLONEL DANIEL — I would like to have on the record here your opinion of any difference of control response, or the severity of an unstart, between a YF-12 and an SR-71.

25X1A

[redacted] I would say that there is no difference. They are both severe, and the severity of them seems to be almost a direct function of your speed and knots-equivalent-airspeed - the higher the equivalent airspeed, the more severe the unstart.

COLONEL TEMPLETON Would you comment on the practice by the Cat I test aircraft in terms of their fuel scheduling, and attempt to get a fairly low trim drag for these cruise missions. Was your fuel system set up to give you the best fuel conditions?

25X1A

[redacted] At no time have I ever punched on a tank in order to get an Aft C.G. This could only be done initially by punching on tank #1 or tank #2.

COLONEL TEMPLETON As I remember, #2001 encountered some Aft C.G.s in your flights. Would you describe the control response, or feel of the aircraft in this condition?

25X1A

[redacted] First, I'd like to make a brief comment on how this occurred. This was totally unpredictable. We didn't know about it until after it had happened. After the engines were started, this was on #2001, the flight was delayed a considerable amount of time due to an electrical problem on the aircraft and then the nav system had to be fast-aligned, which took an additional 20 minutes. At the exact same time, the bus tie split on the aircraft. So, rather than lose the flight, I pressed on the crossfeed and we continued on. Now the reason the crossfeed was turned on was that in the event we lost the generator on a particular side of the aircraft, we would have lost that engine also. From a safety-of-flight standpoint, it seemed like the thing to do, and the thing we have always done in other machines, is to punch on the crossfeed. What we found out was that, once tank #1 had reached the Christmas Tree level, this cuts off the two pumps feeding the right manifold. You then have two pumps in tank #1 two pumps in tank #2 feeding the left manifold, and two pumps in tank #6 feeding the right manifold. The net result is that the four pumps, the two in tank #1 and the two in tank #2 feeding the left manifold, and two pumps in tank #6 feeding the right manifold. The net result is that the four pumps, the two in tank #1 and the two in tank #2 with corssfeed on, will overpower the two feeding from tank #6. In addition, once you're in flight, the two pumps in tank #6 are pumping against a head, due to the angle-of-attack of the aircraft. So we literally drained tanks one and -- I said tank two -- I meant tank #3. We drained tanks #1 and #3. Now, to get to your specific question, I believe my

comments were that the aircraft was, I think I said, pretty "squirrely", it was extremely "sloppy" and I can relate this directly to the flights back on #1001 during the speed attempts, and during the first attempt at extending the envelope. Even with the full authority of the SAS, and I do have the world's most respect for that piece of equipment, you could tell that this airplane was extremely sloppy, and I so stated.

COLONEL FUSSELL

We're concerned here about the training and the qualifications of the pilots in the program. Realizing that the Air Force does not control this; or at least at this base, could you tell the board your estimate of [redacted] qualifications? 25X1A
Also, what type of a program does Lockheed have to maintain proficiency on all of its pilots?

25X1A

[redacted]

Sir, I'm afraid I can't give you much of an answer to any of your questions because as you may or may not know, I came to Lockheed on this program from Hughes Aircraft Company. Consequently, I only had personal knowledge of one pilot at Lockheed prior to going to work for Lockheed. From the standpoint of [redacted] he is probably one of the most educated pilots that we have. He's had a very fine background from what little I know of it. I personally have never flown with him. We are generally working in different locations at all times, and it is not my prerogative to analyze any of his data. In my own personal opinion, I have always felt that he was a good boy, though. On the question of proficiency - again, this is totally out of my hands. It all falls under the jurisdiction of [redacted] the chief pilot for Lockheed. Any answer in this case would have to be given to you by him.

25X1A

25X1A

COLONEL DANIEL

Even in flights that you had an unstart where you had a healthy C.G. margin, and you knew it was a good C.G. margin, would you still say it is very important to get on the controls right away to get your attitude back to level flight conditions?

25X1A

[redacted]

Yes, I feel very strong about this, that it is. And the amount of control that is required again is directly related to the center-of-gravity and the knots-equivalent-airspeed. I feel the first thing that should be done is to get this airplane flying straight-and-level, or as near straight-and-level as possible before anything is done. You certainly don't have to tell anyone which rudder to push. I feel that these items are instinctive.

COLONEL FUSSELL — In the event you fail to react promptly enough, and in the event in this split second of timing the aircraft exceeds those limitations, do you feel that you have enough control, let's say in 13° Pitch Attitude and Mach 3, to recover the aircraft?

25X1A

[redacted] — Sir, the question was asked a little while ago in a different form and I can only give you the same answer. I don't know. It is completely intangible. I can't say what it would take in a situation I've never been in.

Were you given, in a Simulator, any kind of attitude that was experienced by you in unstart at high Mach at high altitude, and how was the reaction?

Sir, I've never been in a Simulator. I was flying the airplane some three years before the Simulator was built, and the only connection I've had with the Simulator was to go back on the Mock-Up Board.

Do you know of other pilots being put in the Simulator for the SR-71 and given these conditions in flight and whether or not it got away from them?

No Sir, I'm not knowledgeable of any program that is being run on the SR-71 Simulator. It is up at Beale AFB. I've had no occasion to go up there and I've had nothing whatsoever to do with it.

COLONEL FUSSELL — I would appreciate it if you would not discuss this with any other witnesses. You are excused.

A TRUE TRANSCRIPT

Donald R. James

DONALD R JAMES
Major, USAF
Recorder

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25X1A

CONTINUATION OF BOARD TESTIMONY BY [redacted]
TAKEN AT 0930 HOURS, 3 FEBRUARY 1966

25X1A

COLONEL FUSSELL — [redacted] in the original interrogation you were asked by Col Daniels, what was the last Angle of Attack reading you recall. Your answer at that time - Quote "It seems to me that it was approximately 3½°. I recorded a lot of Angle of Attack readings throughout the flight, but I believe the Angle of Attack reading I saw in conjunction with 2½° nose up pitch trim was 3½°." Unquote. Now on your dictet we get a readout along the latter part of the flight - Pitch trim 4½° nose up. Also I'd like to add that in the investigation of the metal itself, the jack screws are set at 2.8. After some additional thought could you tell us what the last nose up pitch trim was, whether it was 4½ or 2½?

25X1A

[redacted] — Yes Sir. The last nose up pitch trim indication, which I recall seeing was 2½°. I don't recall seeing 4½° nose up pitch trim, on this particular leg.

COLONEL FUSSELL — The board felt that the fact that you stated 4½° nose up trim, in the dictet, was probably more authentic then your subsequent statement of 2½°. However, I've been told by the people that have listened to this intently that the dictet is garbled and it's hard to determine whether its 4½° or just what. Your statement then is that it's 2½° nose up trim?

25X1A

[redacted] — Yes Sir. I don't ever recall seeing the pitch trim over 3° on this leg. I believe 2½° was the maximum nose up pitch trim that I saw on this accel and this cruise.

COLONEL RICHARDSON — Bill, have you ever had a parachute accidently activated while you were still sitting in the aircraft?

25X1A

[redacted] — No, I haven't.

COLONEL RICHARDSON — Bill, while you were still in the aircraft, in this brief moment, did you feel any pull pressure on the shoulders in the aircraft or did you notice it?

25X1A

[redacted] — No, I didn't notice any pressure at all, of that nature.

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COLONEL RICHARDSON — Do you recall, definitely that the suit was inflated while you were falling on the drogue chute and if so do you have any feel for time?

25X1A [redacted] — Yes, the suit - my first recollection, as soon as I realized I was falling, was, one of my first recollections was, that the suit was inflated. But I don't really have a good idea of the time of fall, with the suit inflated. I have thought about it, and have estimated approximately a minute and a half.

COLONEL RICHARDSON — Also, do you have any conception of time in this fall prior to the main chute deployment?

25X1A [redacted] — Actually, that minute and a half period is in reference to time of fall prior to main chute deployment. Not necessarily suit inflation time.

COLONEL RICHARDSON — Bill, one question I have that you mentioned in your other statement that you noticed Jim was below you. Have you thought any about that. Now do you feel Jim was above you or below you?

25X1A [redacted] — I'm sure he was below me, and I would estimate about 500 feet. Just slightly below me.

COLONEL RICHARDSON — Since you left the hospital in Tucumcari, have you noticed any other soreness stiffness or bruises, that you would care to talk about now?

25X1A [redacted] — Yes, I noticed that my left ankle was swollen and bruised, altho it wasn't sore. It was swollen and there was a very large discoloration on the inside of the left ankle. But no tenderness or soreness at all. And one bruise on my left thigh, which I believe they noticed in the orginal examination. That was the only mark that I found that might have been made from the lap belt.

COLONEL FUSSELL — Is that a bruise on your right wrist?

25X1A [redacted] — That was noticed originally in the orginal examination. I don't know where that came from.

COLONEL RICHARDSON — Have you noticed any soreness across the abdomen?

25X1A [redacted] — None whatsoever. My stomach muscles were pretty sore, but I think that was more from tenseing up then from anything else.

COLONEL DANIEL — Bill, on the first leg of the flight, you stated and in the dictet we found that you had been using crossfeed. Do you recall positively turning the crossfeed off?

25X1A [redacted]

Yes I do. I used crossfeed for seven minutes. I recall definitely turning it off. I did not turn it on again inflight.

COLONEL DANIEL — Bill, yesterday you were at the SR-71 simulator at Beale and you ran a series of profiles which approximate the profile that you were in prior to the accident. Would you give us your impression of this simulation and as how it compared with the actual flight conditions?

25X1A [redacted]

Yes, the simulation at 27% c.g., in a 35 degree right bank, in a slightly climbing attitude, was, I would say very realistic as far as the pitch rate response was concerned. On two particular occasions in the simulator, the simulation appeared to me to be, almost what I saw in the aircraft. On other occasions I was able to control it, but only by making a conscious effort and devoting almost my entire attention to pitch control.

COLONEL DANIEL — Bill, would you describe this pitch rate, on the simulator, where you lost the aircraft, as to how noticeable is this. Is it something a pilot would in his normal flying catch immediately or is it a little bit slower than that where it might not be so noticeable?

25X1A [redacted]

It's noticeable only if the pilot is looking at the angle of attack indicator. It was not apparent on the attitude indicator or vertical speed indicator. But I did notice after seeing this pitch rate and pitch up response, correlating it with the angle of attack indicator, I was able by concentrating almost completely on angle of attack indicator, plus attitude, I was able to control the pitch rate. Although, angle of attack in some cases would build up pretty high, I was able to control it by anticipating pitch rate on angle of attack indicator. But it isn't evident unless you are concentrating on angle of attack indicator. In the aircraft it wasn't detectable visually.

COLONEL DANIEL — Bill, do you feel that with the type of control system that is in the SR-71, that a pilot maybe able to detect an aft c.g. condition through the control forces?

25X1A

[redacted]

Yes, this is possible. I've noticed it on on several occasions in the past. It's particularly true in the subsonic region, where the aircraft gets very sloppy in pitch, and it's ordinarily noticeable in a turn, at high Mach. On this particular occasion I did not notice any unusual sloppiness or aft c.g. feel entering this turn or in the turn. I have, as I said before, noticed that several times in the past and the airplane is very sloppy in pitch with an aft c.g. and its readily detectable but on this occasion I didn't notice this sloppiness entering the turn.

COLONEL DANIEL

Bill, would you describe this sloppiness as a response or as a control force that you can feel change in control stick forces?

25X1A

[redacted]

I would describe this more as a response than as a change in control force feel.

COLONEL DANIEL

Bill, after your simulation and after this flight do you feel a c.g. readout would be desireable in this aircraft?

25X1A

[redacted]

Yes I do.

Bill, prior to this experience with 17952 have you ever had any previous experience in your flying with this type of aircraft where the plane was marginal or you felt you were in a critical position.

Yes I have on one other flight. I had an experience not similar to this but approaching this where the c.g. was too far aft on takeoff. I've related the two experiences in my mind. The aircraft response in the other case was similar to what I have just discussed. It was extremely sloppy in pitch and right after takeoff had a definite nose up tendency which required practicaly full forward stick. Transferring fuel forward alleviated this condition and attitude normal control was regained by transferring fuel forward.

Do you recall what the aft c.g. was?

On that flight?

Yes.

I believe it was, no I don't recall the exact figure.

How many hours have you flown in this type aircraft?

I think about 70.

25X1A [redacted]

And that was your only other experience where the aircraft may have been critical. Is that right?

Yes sir.

Do you know of other pilots experiencing troubles where the airplane was marginal?

I can't recall any specific incidents of that nature.

Thank you.

COLONEL RICHARDSON Bill, on descent on the main chute, you stated that you waited until the main chute opened to raise the faceplate, and when you raised the faceplate did you have any difficulty keeping it up, on your way to the ground or did it stay up normally?

25X1A [redacted]

No I didn't have any difficulty during the parachute descent with the visor.

COLONEL RICHARDSON Again Bill, after the main chute had deployed did you look up at the main chute to check its condition and so forth and if you did, did you notice the drogue chute or stabilization chute anywhere?

25X1A [redacted]

Yes, I looked up at the main chute, but I did not notice the drogue chute.

Then further on in your descent I assume you were looking down trying to figure out the spot where you were going to land did you ever notice the drogue chute or stabilization chute hanging below you?

No I didn't notice it. The only thing I noticed was the chute bag falling free.

Getting back on the pitch trim subject again, as I said before I don't recall ever seeing the pitch trim above 2½ degrees on this leg and the 4½ degree figure in the dictet is quite probably in reference to the angle of attack indication rather than pitch trim.

A True Transcript

Donald R James
DONALD R JAMES
Major, USAF
Recorder

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25X1A BOARD MEETING, 1000 HOURS, 3 FEBRUARY 1966

[redacted] I am Colonel Fussell, President of the Accident Investigation Board.

The sole purpose of the investigation is to determine all factors relating to the accident incident and in the interest of accident prevention to preclude recurrence. The investigation will not be used as evidence or to obtain evidence for the use in diciplinary action to determine pecuniary reliability or line of duty status or to revoke commission or to support a demotion or to remove from the active list under the provisions of AFR 36-2 or for the use before a flying evaluation board.

The board has several questions we would like to ask you today.

COLONEL FUSSELL — Indications from various pilots of the SR-71 is that unstarts are relatively common in the aircraft and the ensueing moments require considerable skill and rapid reaction to prevent the loss of lateral or pitch control. Will you tell the board your own experience in the aircraft, whether or not you have ever experienced the loss of lateral or pitch control and in the process what your center of gravity, speed, altitude etc., was at the time of the experience and recovery?

25X1A [redacted] — Well, of course, I've never lost complete control of an aircraft as a result of an unstart. However, I feel that your reaction time is important as a function of aft c.g.. We have been, in Flight Test, experimenting with further aft c.g.'s primarily with a view toware increasing range. But if you assume that we have a c.g. that's 25% or further forward than the control ability, I think, is quite satisfactory. It's important for your reaction time, in my opinion, to prevent inertial moments from developing, which when you put in your control you have to first of all oppose and stop, and then correct it to the position in which you would like to have it. I could talk about these unstarts all day. I don't know in particular just what aspect of them you'd like. We have our particular procedures that we follow and some of them vary to a certain extent, depending on how high you are and just what your conditions is.

COLONEL FUSSELL — At this stage of the investigation unstarts become secondary. We would like to confine the discussion to lateral and pitch control with reference to aft c.g., Mach, weight, etc.

25X1A [redacted] — Your now asking me to discuss the handling characteristics apart from unstarts. Is that correct?

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COLONEL FUSSELL — That's correct.

[redacted]

25X1A

I feel that if you don't have the unstart and you don't put any loaded maneuvers on the aircraft, then the handling characteristics are quite satisfactory. They degrade rapidly with further aft c.g.'s. Now where this point is is under investigation by Flight Test. In other words its a nonlinear relationship, I think. You can go for example from 24% c.g. to 25% without suffering any degradation, particularily in handling characteristics or flight qualtities, but when you go from 25 to 26 its more marked and 26 to 27 even more marked. The way I have written these things up on my pilot comments, for any of you who have ever happened to read them before. I usually call this sloppy on the pitch axis and by that I mean when you put a stick force in and you get a certain "g" loading right away you go nonlinear on stick force per "g". This means that it makes it more difficult to fly the aircraft. It's a little sloppier is the best way I can define it.

COLONEL FUSSELL — Would you tell the board approximately how many hours you have in this aircraft?

25X1A

[redacted]

I'm sorry I don't have the slightest idea. I don't keep track of that but I'm sure the company keeps track of that.

COLONEL FUSSELL — Can you give me an approximation?

25X1A

[redacted]

I probably have as much as anybody else in the airplane. [redacted] estimates my time in the aircraft at perhaps 300 hours.

STATOTHR

COLONEL DANIEL — Bob, your experience in the aircraft, have you ever been in a condition where it took full forward control stick movement in order to control the pitch?

25X1A

[redacted]

Right. I've had one incident where that was the case and it was while performing a structural test at 2.6 Mn, 450 knots and with a c.g. of 26.3%. I looked this up on the record recently thats the reason I'm familiar with all these particulars. We overshot the particular test point that we intended because of the fact that even tho I had the stick full forward, well below the maximum "g" point the airplane continued on up as a result of inertial forces. I think that this test is somewhat pertinent to the matter at hand, here today.

SECRET
SPECIAL HANDLING REQUIRED

COLONEL DANIEL Bob, the pitch rates, which you've seen generated at aft c.g. conditions, both inflight and in the simulator, would you describe these rates as being very high, which would be readily apparent to a pilot, or would you describe them as being fairly nominal or small rates which would not be apparent to the pilot?

25X1A [redacted] I would say with these aft c.g.'s, and its a function of how far aft you are.

COLONEL DANIEL Bob, do you feel that the fuel system and its management that we have in the aircraft today. That it would be an assist to have a c.g. type indicator in the aircraft?

25X1A [redacted] There is no question that it would be an assist to have a c.g. indicator in the aircraft but I don't believe that it is presently compatible with our type of fuel indicating system. However, we've got a new one under way sometime ago, I think G.E. makes it, and it would be compatible with a c.g. indication. Talk about getting a system that would be compatible with computation inflight of a c.g. for pilot presentation. Since we don't have that today, in lieu of that, we've had to develope capability of determining and interpreting the readouts on the pitch trim indicator.

COLONEL DANIEL Bob, along that line using the pitch trim indicator, from your past experience would you say that at fuel weight of roughly 40,000 lbs, flying in the 78,000 foot region, at cruise speed, that a pitch trim indication of 3 degrees nose up would lead you to believe that you were towards an aft c.g. limit?

25X1A [redacted] Right. This would be a function of your gross weight and of course, your angle of attack and this would be also a function, whether you were straight and level or in a turn. And so from particular aircraft I've been able to review the records on our instrumented aircraft later and actually make a pilot correlation for my own benefit, so that I am able to better use the pitch trim indicator for c.g. determination. On this particular aircraft 3 degrees or so would be somewhere around 26%, I believe, at that gross weight, from my previous experience. For example, #2 airplane is slightly different fro #3 and I guess for a given condition, for example, the pitch trim indication is slightly different. It's slightly further down for given conditions in 2002 for example, then in 2003. The only explanation I could offer for this is the fact our calibration on the instruments are slightly different.

SECRET
SPECIAL HANDLING REQUIRED

COLONEL DANIEL: Bob, this airplane has a long term fugoid motion at cruise speed at high altitude. Would you discuss this as related to the pilot's ability to keep the airplane in trim at all times.

25X1A [redacted]

Right, I'll discuss the straight away long term fugoid and the handling characteristics. A fugoid is a result of the interchange of energy between kinetic and potential and I think the Aero Dynamacists have told me that it's 1 1/100th of a Machs equivelent to about a 1000 feet. This is what gives you sort of a basic, it's not instability, but a basic up and down motion of the aircraft over a long term period, I think thats 3 to 4 minute period, but this really would be no trouble at all to control as far as handling characteristics are concerned. It's the short term stuff that would get the pilot in trouble, I think on the pitch axis. I don't think the fugoid itself is pertinent to this.

COLONEL DANIEL Well, does it make it more difficult, to say, to keep the airplane in trim, using pitch trim?

25X1A [redacted]

I would say, yes. Ordinarily the pilot has to use the stick force to get the airplane stable on a given selected Mach rather than being able to do this as in so many other aircraft by merely trimming it. For example, I'm flying very precise instruments in other aircraft I like to not use any stick force at all but keep it close enough to where I can merely trim it and hold my Mach. I've found that I've tried to do it this way in this airplane but I think that the SAS masks the trim effect to a certain extent so that I've found it better to go ahead and use stick force and your able to control it more precisely.

COLONEL DANIEL Bob, you stated that you felt in this airplane 3 degrees pitch trim would run you around 26 percent fairly aft c.g.. However, are you familiar with the ADP Instructions which state that below 30,000 lbs of fuel that forward transfer should be used in order to assure that you have at least 3 degrees nose up pitch trim?

25X1A [redacted]

Well we've changed the rules on this so many times, in Flight Test, that I'm not certain that we have a hard and fast rule on such a thing as that. I try to use my experience in the aircraft and use this primarily as a guide, because we do have the aft c.g. under investigation at this time and with the views I've mentioned before toward maximizing range. Thats the whole purpose of this.

COLONEL DANIEL Bob, on this simulator were you able to duplicate the conditons as you knew them on the flight, where the accident occurred, and what were the results of your simulation?

25X1A

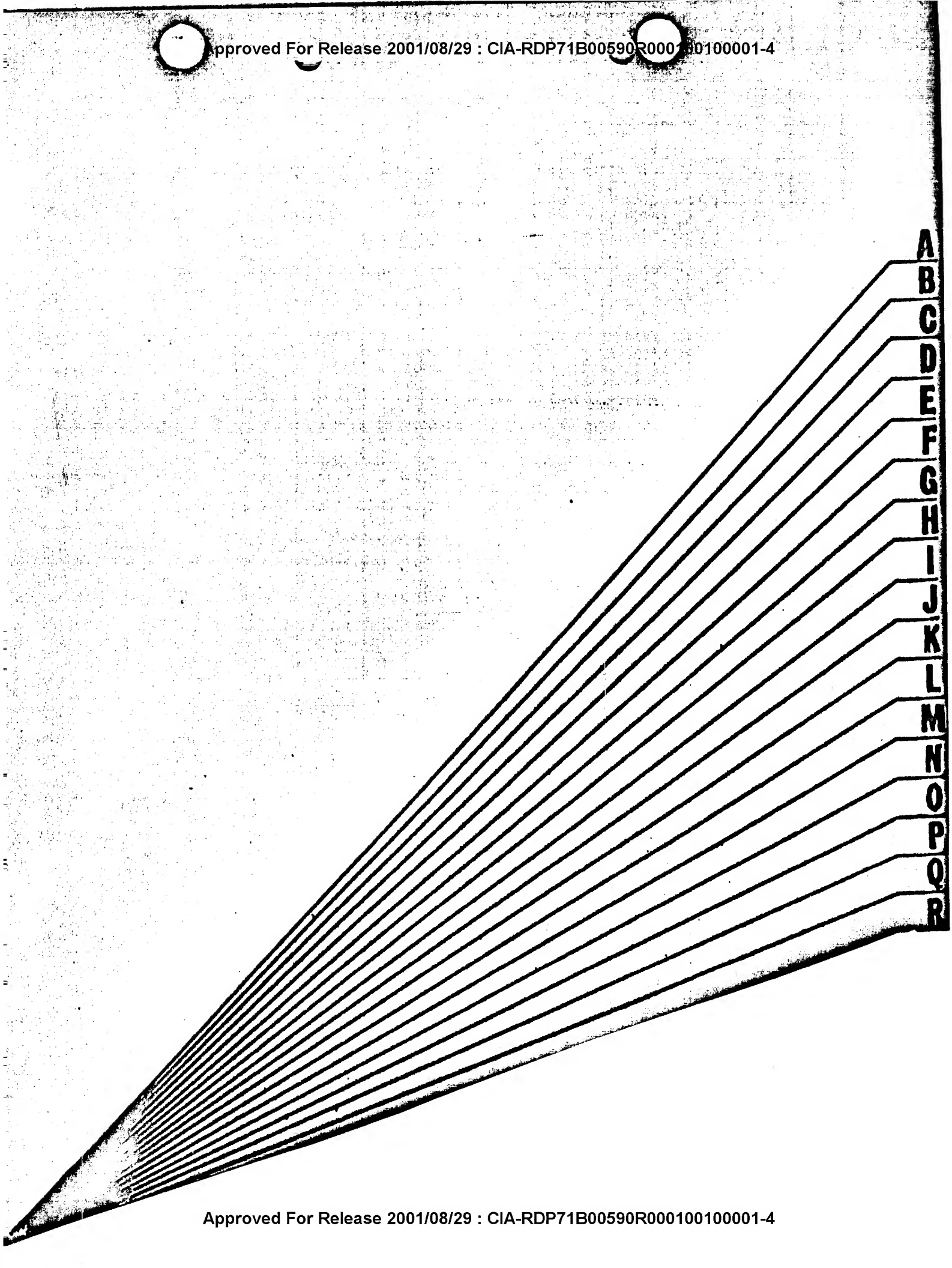
[redacted] Well, the simulations that we ran consisted of putting the c.g. at different positions, all of them quite far aft, and then establishing bank angles and then assuming unstarts on the down engine, that is the engine that is lower in the turn. Which we feel is the situation in the accident. Then take immediate corrective actions. We were writing records on principle parameters during thest tests. To a certain extent, while this simulates the aero dynamics I feel sure it doesn't simulate the condition in the aircraft because I was sitting there expecting all this to happen and was gearing my reaction times to be immediate. We tried to get around this to a certain extent. In some of the later tests, by permitting the aircraft continuing rolling, from say 35 degree bank to a 60 degree bank angle, before I would initiate corrective action on the roll axis. We tried to initiate unstarts in the middle of all this, sometimes without the motion system on, again to try to prevent the reaction from being so immediate such as an unsuspecting pilot might have who was actually flying the aircraft. Also, I would like to comment that in these tests there's a certain amount of learning curve on the part of the pilot. He gets more proficient at doing them so as he starts watching ALPHA for example, in the simulator, which ordinarily I don't watch inflight. You can sense this through your seat of the pants "g", "g's" that you feel. But we ran all of these tests and I think that it is likely that we've investigated the very area that caused the airplane 2003 to have its accident. Specifically, we found that a 26½%, when we duplicated this maneuver it was very very touch and go and I was able to control the thing nearly evertime, but I was really working hard and really in a sweat when I came out of there. I also established that if you permit any type of positive pitch rate to develope in the middle of all this then you can go to the full forward stick condition and depending on the rate of the pitch on the positive side, it depends on whether or not you are able to recover the full forward stick. That's very important. You don't want to let these inertial couplings develope about any of your axies, and that includes the roll axis, but pitch is most important. At 27%, that was as far aft I believe as we went in the simulator, then I did some investigation on getting the airplane up to 11 and 12 and 13 and even 14 degrees ALPHA, but you

have to do it by arriving at that ALPHA with a zero pitch rate. If you can do that, then you have just sufficient control, to control the aircraft. But if you have any type of positive pitch rate, even at 8 or 9 degrees, then its a hazardous maneuver and touch and go.

A True Transcript

Donald R. James

DONALD R. JAMES
Major, USAF
Recorder



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SECRET

SPECIAL HANDLING REQUIRED

MILITARY FLIGHT PLAN

AIRCRAFT UNIT OF ASSIGNMENT/HOME STATION: LAC / EDWARDS AFB

AIRCRAFT SERIAL NO.: 17952

TYPE OF FLIGHT PLAN: [X] IFR [ ] DVFR [ ] VFR [ ] PVFR

RADIO CALL/TD CODE: DUTCH 5418

AIRCRAFT DESIGNATION: SR-71

ESTIMATED TRUE AIRSPEED: 5C

DEPARTURE TIME (Z): PROPOSED 1900 / ACTUAL

INITIAL CRUISING ALTITUDE: 600+

POINT OF DEPARTURE: EDW

STANDARD INSTRUMENT DEPARTURE: NAME AND NUMBER: VFR CLIMB IN SOA / TO:

IFR	VFR	ROUTE OF FLIGHT	TO	ETE/EET
V		(AMW) NOAH, BEATTY (ARCP-30 MIN. DELAY), ELI, 360° LOOP AROUND BAKERSFIELD TO BEATTY TO PAKEETNERS, EDW		

REMARKS: DEPT SOA "A" FL 450+
DESC, SOA "A" BELOW FL 600
REFUEL BEATTY (FL 270 TO 310)
DEPT SOA "C" FL 390+

HIGH RANK CODE:

DV HONOR AND/OR SVC CODE:

RANK/HONOR CODE:

PSGR/CARGO CODE: DESC. SOA "A" BELOW FL600

HOURS FUEL ON BOARD | DIST TO DESTN | ALTERNATE AIR FIELD | ETE TO ALTN | REQUEST CLEARANCE AFTER

INST RATING | SIGNATURE OF PILOT IN COMMAND | SIGNATURE OF APPROVING AUTHORITY | DATE

CREW/PASSENGER LIST

DUTY	NAME AND INITIALS	GRADE	SERVICE NO.	ORGANIZATION AND LOCATION
PILOT IN COMMAND	[redacted]	CIV		LAC, EAFB
RSO		CIV		LAC, EAFB
	25X1A ACCIDENT			

PILOTS PREFLIGHT CHECKLIST

	NOTAMS		AIRSPACE RESTRICTIONS		AIRCRAFT/DESTINATION NAV AIDS
	WEATHER AND WINDS		CHARTS, PUBLICATIONS, MAPS		DD FORM 365F (Weight and Balance Clearance Form F)

DD FORM 1 NOV 68 175 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

SECRET

SPECIAL HANDLING REQUIRED

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FLIGHT WEATHER BRIEFING | AIRCRAFT NO. 952 | BRIEFING NO. 1 | DATE 15 JUN 66

I. TAKEOFF DATA

RUNWAY END	PRESSURE ALT	TEMP DEVIATION	VAPOR PRESSURE	SPECIFIC HUMIDITY	DENSITY ALT/FUDS
25 F	+2050 FT	—	—	—	—

CLIMB WINDS 12Jw 330 WIND 21V
Climb 310/30 KTS

REMARKS NONE

II. ENROUTE DATA

FLIGHT LEVEL	TEMPERATURE	WINDS
6000+	—	12Jw - ATP - [illegible] 330/15 - 33°C

CLOUDS AT FLIGHT LEVEL 6000+ ☐ YES ☑ NO ☐ IN AND OUT

VISIBILITY AT FLIGHT LEVEL 10+ ☐ HAZE ☐ DUST ☐ SMOKE ☐ PRECIPITATION

MINIMUM CEILING ENROUTE Region 1000 FT AGL

MAXIMUM CLOUD TOPS Region 30000 FT MSL cntf

MINIMUM FREEZING LEVEL Stc nthrs cntf

THUNDERSTORMS	TURBULENCE	PRECIPITATION	ICING
☑ NONE	☐ NONE	☑ NONE	☑ NONE
☐ FEW	☑ CAT ☐ LGT	☐ RAIN ☐ DRZL	☐ CLEAR ☐ LGT
☐ SCATTERED	☐ TSTM ☑ MOD	☐ SHOWERS ☐ SNOW	☐ RIME ☐ MOD
☐ NUMEROUS	☐ SVR	☐ FREEZING	☐ MIXED ☐ SVR
☐ HAIL	Nthrs cntf Stc 250-330 10FT Mtn - Wdly Mixed 300-450 FT		☐ IN CLOUDS

III. TERMINAL DATA

~~DESTINATION (Existing)~~

FORECAST 12Jw 250-01 10+ 21V (30.14) 1115Z 2000Z 2 TO 0030Z 2)

~~ALTERNATE (Existing)~~

~~FORECAST~~ (2 TO 2)

IV. COMMENTS/REMARKS

~~VOID TIME~~ 2000Z 1130Z | EXTENDED TO | FORECASTER J H Van Kennedy

V. TELEVISION/TELEPHONE BRIEFING RECORD Last call 0431Z pic

WEATHER FACILITY

TAPE NO.	START	STOP	PHONE CHARGE

DD FORM 1 NOV 64 175-1 D-8725

SECRET

SPECIAL HANDLING REQUIRED

952/25 JAN 66

MISSION COORDINATION SHEET

SPECIAL REQUIREMENTS		IDENTIFICATION	FLIGHT PLAN ROUTE	TO	FLT LEVEL	REMARKS
~~Brief~~	Load P.E.: 0915	Callsign: Dutch 54	EDWARDS	~~DP~~ RND 285/60 climbing to E/L 600+	Dep SOA A 450+	~~DP~~ NFL
Load Crew 1000		Takeoff: 1100	333/159, RBL 321/78, SBA 325/75,	DAG 296/87	DAG 279/94	DAG 345/3
Mission: 26215		ETE: 4+00	Bty 119/57, Bty 290/310 FOR A/R w	FATE 53	~~DP~~ Bty 144/50	
High Range:		Crew: [redacted]	climbing to E/L 600+ Dep SOA C	n/o 390+	Dvt Bld 245/56, Bld 247	
Special			254/58, TCS 085/138, CHD 251/118, BFL 287/50 — MRK 360° Turn			
High Frequency: 11655/7330		Suits ~~Ovr Water~~	CANIES ACFT over FRESNO, Bty,	BFL — TAKE a 195° Turn to Rendezvous		
Telemetry: Readout Tape		Type Aircraft: SR-71	SOA at FURNACE Creek descend in SOA A to Recover.			
TANKER: Call Sign: FATE 53			the 360° Turn may Touch Tip of R-2524 above 600.			
Fuel Quantity: 80m		Callsign: AF 755	EDWARDS			
A/R Area: Bty		Takeoff: 1100				
A/R Altitudes: ←290-310 320 Kias		ETE: 1+20		SOA A 240-450		
Control Time: 1205		Crew: HOA 6		C 290-310		
OTHER FLYERS: Area: WSMR						
Acft: D-59		~~Suits~~ ~~Ovr Water~~				
Alt: 600		Type Aircraft: F-104				
Time:						
Approved: - 1230-1330		Callsign: AF 763	EDWARDS			
Space Positioning:		Takeoff: 1300				
S-Band:		ETE: 1+20		SOA A 240-450		
X-Band: Photo Optics		Crew: S/TO FEG				
Askania: 4-4 T.O. only						
Photographer:		~~Suits~~ ~~Ovr Water~~				
OTHER REQUIREMENTS: RANGES: NONE Times:		Type Aircraft: F 104				
PAYLOAD NONE		Callsign:	EDWARDS			
		Takeoff:				
		ETE:				
		Crew:			Sched ✓	PE ✓ [redacted]
					Suits ✓	Radio ✓ Fuel ✓
					[redacted]	[redacted] Beacon ✓
ADIZ: Penetration Point:		Suits Ovr Water			FTK ✓	[redacted] Misc ✓
Penetration Time:		Type Aircraft:			MPC Ext 3610 ✓	
Exit Point:						
Exit Time:						

FFTC FORM Approved 12 OneTime Obsolete upon completion of project

SPECIAL HANDLING REQUIRED

Approx time over 2260 — 2126 Z

SECRET
SPECIAL HANDLING REQUIRED

FLIGHT REPORT

ACTUAL TAKEOFF TIME: 1120 | ACTUAL LANDING TIME:

NARRATIVE ACCOUNT OF PROBLEMS ENCOUNTERED:

COORDINATION | MISSION MONITORED BY (Signature):

ROIC, Operations Division:

Chief, Operations Div. ROIC:

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SPECIAL HANDLING REQUIRED

Speediset ® Moore Business Forms, Inc.

LOCKHEED - CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

SECRET
SPECIAL HANDLING REQUIRED

AIRCRAFT CLEARANCE

AIRCRAFT RELEASED FOR:

	PRODUCTION	✓	TEST FLIGHT		
✓	ENGINEERING		DELIVERY FLIGHT	✓	COMPANY PILOT
	L. A. S.		SPECIAL FLIGHT AS INDICATED		CUSTOMER PILOT

WORK ORDER NUMBER: 7221-3919-9361

FLIGHT NUMBER: 41

T.O. C.G.	GR. WT.	LDG. C.G.	GR.WT.	TOTAL GALS. GAS	TOTAL GALS. OIL	BALLAST
21.4	138849			80100	36	3016

FUEL DISTRIBUTION

TANK	AMOUNT	TANK	AMOUNT	TANK	AMOUNT
1	14900	4	9750		
2	13100	5	11200		
3	16000	6	14900		25X1A

Necessary Adjustments and Servicing Have Been Completed And Aircraft Is Approved For Flight

DATE: 1/25/66 TIME: 1010 SIGNATURE: [redacted]

This Aircraft Has Been Inspected And Approved And Is Hereby Released For Flight

DATE: 1/25/66 TIME: 1010 SIGNATURE, INSPECTION DEPARTMENT: [redacted]

FLIGHT CLEARANCE: THE LATEST WEATHER SEQUENCE HAS BEEN CHECKED BY THE UNDERSIGNED WHO AGREE THAT CONDITIONS AND WEATHER ARE SUITABLE FOR COMPLETION OF THIS FLIGHT AS PLANNED. WEATHER IN ALL ASSIGNED AREAS IS APPROVED FOR FLIGHT EXCEPT:

25X1A

CREW AND PASSENGERS

CODE	EMPLOYEE NO. OR COMPANY	NAME	DEPT.	HOURLY
	417439	[redacted] PO ENG.	72/74	
		25X1A		

TOTAL PASSENGERS | PASSENGER MINUTES

DISPATCHER: 25X1A DATE: 1/25/66

PI[redacted] EMPLOYEE NO. 475464

MODEL: R12 SERIAL: 2003

LICENSE: 17952

PURCHASER:

TYPE OF FLIGHT:

TAKE OFF POINT			
LANDING POINT			
LANDING TIME			
TAKE OFF TIME			
FLIGHT TIME			

LANDINGS: NIGHT: DAY:

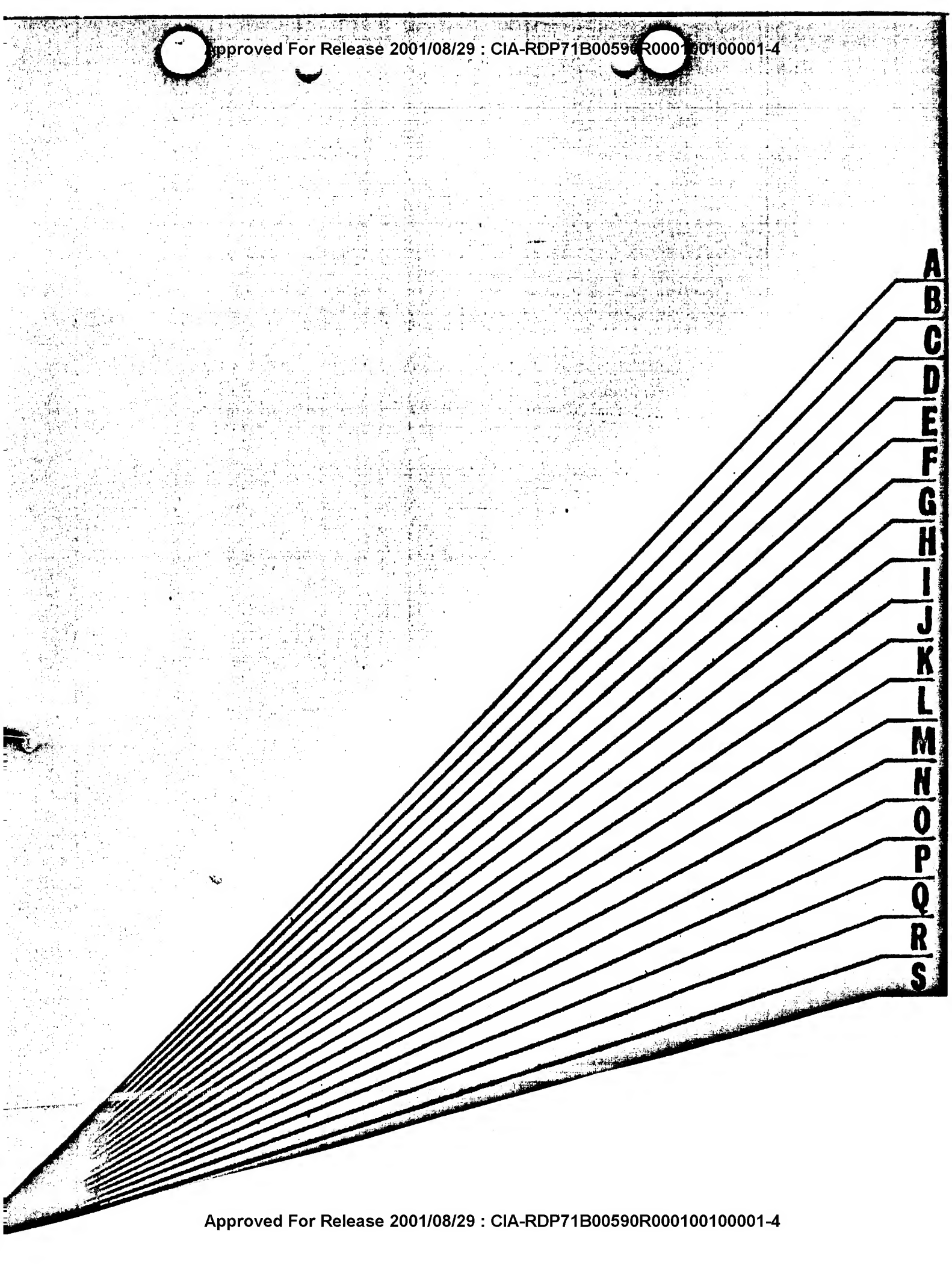
APPROACHES: ILS: RANGE:

INSTRUMENT TIME: ACTUAL: HOOD:

PILOT:

FORM 1284-10 ®

SECRET
SPECIAL HANDLING REQUIRED



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SECRET
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U-2 FLIGHT LOADING SHEET

2003 Issue Date 1-24-66 Issue Time 1300

Test # 53 Flight # 41 Flight Date 1-25-66 Flight Time 1100

Pilot [redacted] 25X1A RSO [redacted] 25X1A F.T. Engineer [redacted] 25X1A

Tank	Actual Desired	INDICATED QUANTITY - Lbs. Desired	After Fueling		Calibrated Qty. * lbs.
1	14900 (F)	15600	15500	15300	14900
2	12600 (F)	13600	13500	13500	13100
3	15700 (F)	16400	16400	16400	16000
4	9600 (F)	10100	10100	10100	9750
5	11600 (F)	11850	11850	11900	11200
6	7300 2 6900 3 14200 (F)	15200	15300	15500	14900
TOTAL	78,500 (F)	81000	82000		80,100 (Add 1-6)

PAYLOAD Sensors Weight 3016

Liquid Nitrogen: #1 10 Lit. #2 10 Lit. Fuel & Payload Total Wt. 80110 lbs.

Oxygen: #1 10 Lit. #2 10 Lit. Standby 10 Lit.

Engine Liquids:	Left Engine	Right Engine
Oil	Full	Full
Dilmont	N/A	N/A
Remote Gear Box Oil	Full	Full
Spike Emergency Bottles N_2	IN BLOCK 3000 psi	IN BLOCK 3000 psi

Gross Weight 136549 lbs. C.G. 21.6 %

Strut Heights: Nose 2.85 in. Mains 2.6 ins. @ 40 °F (est)

Nitrogen: A 1500 psi B 1500 psi L 1500 psi R 1500 psi

Hydraulic Fluid: A 2.9 gal. B 2.9 gal L 2.9 gal R 2.9 gal

Fuel Wt. — #/gal

Total gal. added 11305

Millipore Rate OK

Hydro Check OK

Load Sheet Completed: T.O. WT. 136000

TANK 1 XMAS TREE TERMINAL STRIP F-72

Desired Shut Off	Connect to Pin A	Pin B
4500	1	3

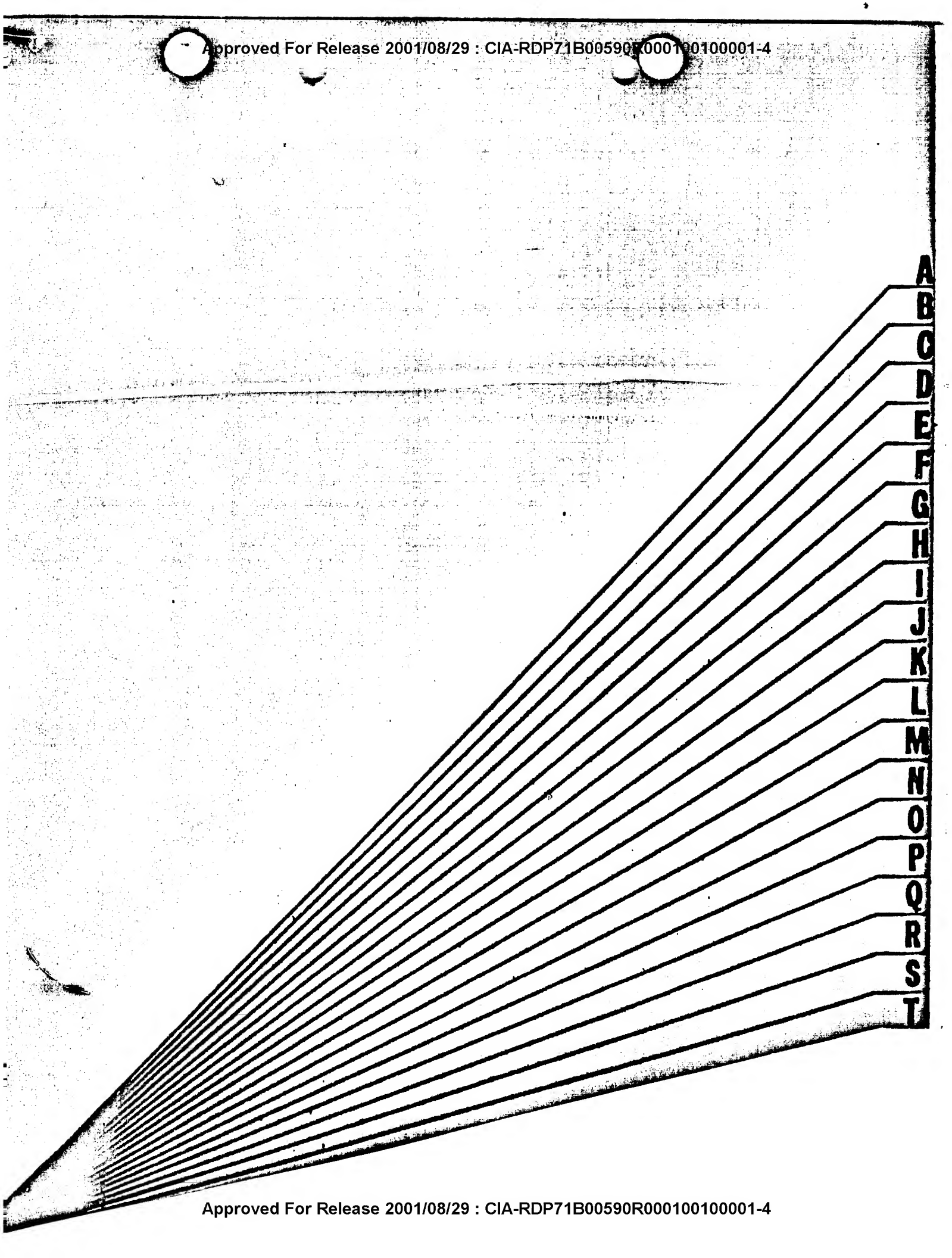
Blank (247)

CREW CHIEF [redacted]

INSPECTION (282) 25X1A

RETURN TO FLIGHT TEST ENGINEERING

SECRET
SPECIAL HANDLING REQUIRED



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SPECIAL HANDLING REQUIRED

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AMARILLO TECHNICAL TRAINING CENTER (ATC)
AMARILLO AIR FORCE BASE, TEXAS 79111
OFFICE OF THE STAFF JUDGE ADVOCATE

REPLY TO ATTN OF: JA-C

3 FEB 1966

SUBJECT: Report of Property Damage, Other Than USAF, Resulting from SR-71 Aircraft Accident on 25 Jan 66 near Tucumcari, New Mexico

TO:

1. An investigation was made and completed 2 February 1966 of property damage, other than USAF, resulting from the above mentioned accident.

2. Properties involved:

STATOTHR a. [redacted] Albert, New Mexico. Parts of the aircraft scattered over this property. No damage sustained by property owner.

STATOTHR b. [redacted], Mosquero, New Mexico. Parts of the aircraft scattered over this property. Only damages incurred were deep truck tracks caused by removal of parts.

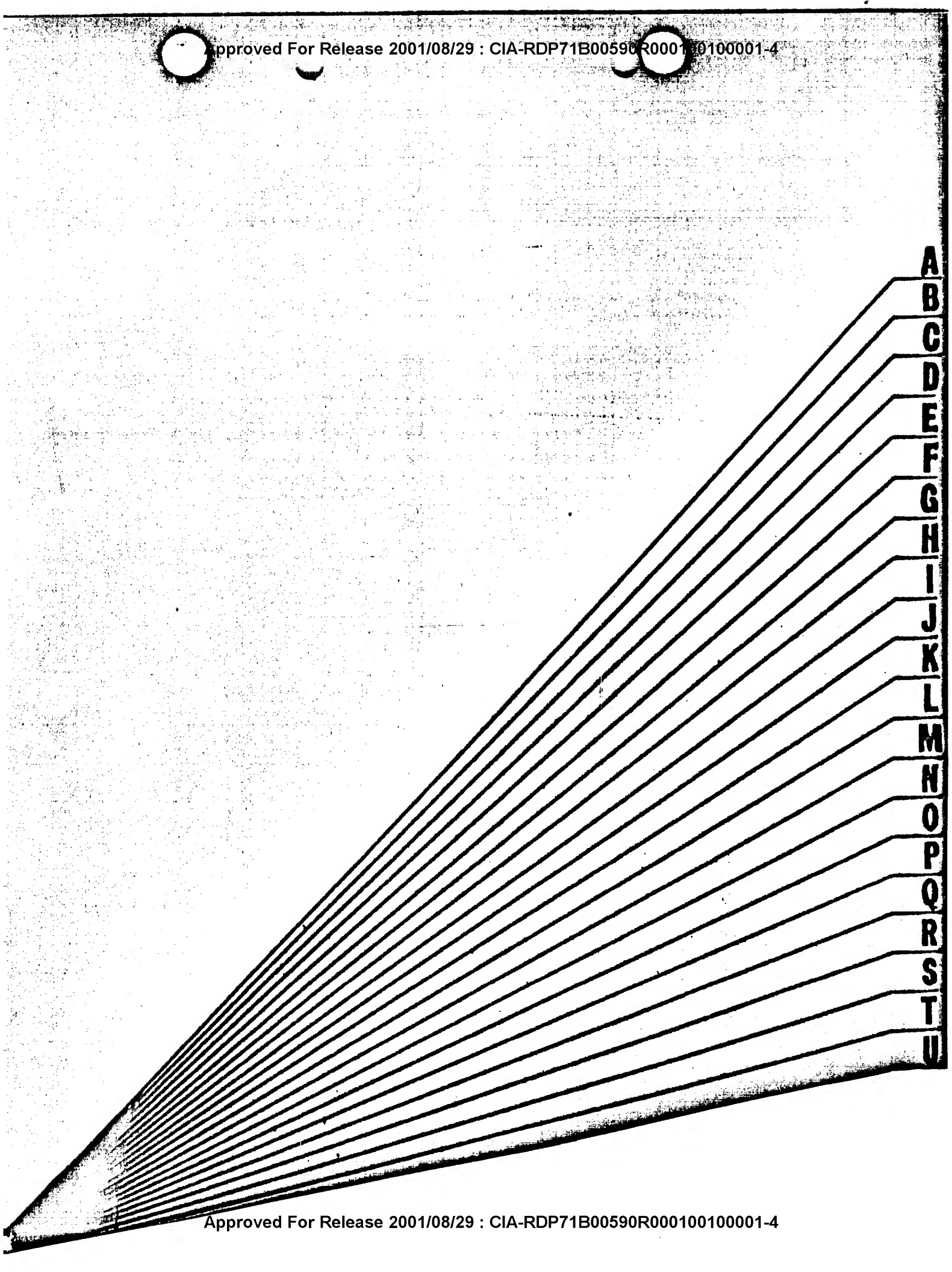
STATOTHR c. [redacted] Bueyeros, New Mexico. Main part of aircraft crashed on [redacted] property resulting in the STATOTHR burning of grassland measuring approximately 80'x20'. A temporary roadway was constructed by USAF personnel from Highway 102 to the crash area. This roadway was .9 of one mile in length.

3. CLAIMS - - All three of the above listed property owners were contacted and each stated emphatically that no claim would be filed against the United States for property damage or services rendered.

STEPHEN K. LESTER, Captain, USAF
Claims Officer

1 Atch
Diagram

SECRET
SPECIAL HANDLING REQUIRED



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SECRET
SPECIAL HANDLING REQUIRED

CERTIFICATE OF DAMAGE TO AIRCRAFT

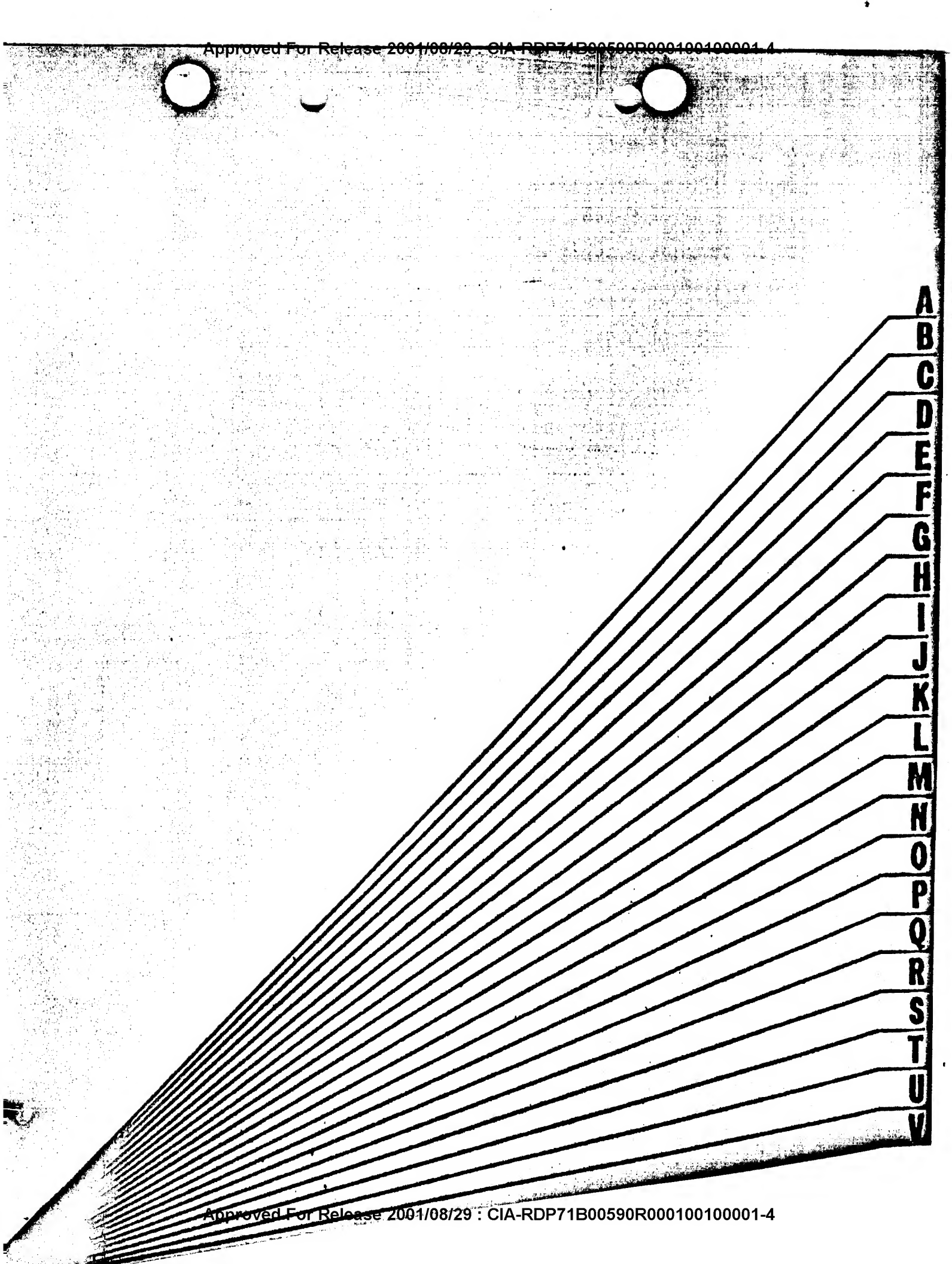
2 February 1966

This is to certify that SR-71 aircraft, serial number 61-7952 was totally destroyed upon ground impact during an aircraft accident which occurred on 25 January 1966 near Tucumcari, New Mexico. The estimated cost of the aircraft is [redacted]

25X1A

Donald R. James
Donald R. James, Maj. USAF
Recorder

SECRET
SPECIAL HANDLING REQUIRED



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SECRET
SPECIAL HANDLING REQUIRED

T R A N S C R I P T I O N

Transcription of notes taken on a portable "Dictet" recorder carried in aircraft. This device is utilized to record data in flight. The recording tape was found in excellent condition. All material transcribed from this tape were made by [redacted] during the flight which terminated in the accident. 25X1A

Left side looks good.
Generators are on the line. Generator lights are out.
Pitch trim - Nose up. Pitch Trim-Nose down
Roll trim - Right roll, Left roll.
Neutral in the roll.
Auto-Pilot - ON
All SAS - ON
Calling Edwards Ground
Request Taxi
Engine Readings on the left in Idle -
RPM - 3650; EGT - 380; Nozzle 12; Fuel Flow - 3700; Oil Pressure 42; "L" Hydro 3300; "R" Hydro 3400; "A" Hydro 3300; "B" Hydro 3300.
On the right side -
RPM - 3580; EGT - 380; Nozzle 12; Fuel Flow - 6400; Oil Pressure 42.
Cleared as filed.
Maintain above flight level 60,000
The left EGT and left Fuel Flow are cycling.
The left Fuel Flow is cycling from about 3600 up to 4000.
The left EGT goes from 372 up to 390 in conjunction with Fuel Flow cycling.
I have a right EGT stable at 380 and a right Fuel Flow of 6400

Engine readings on the left in Military -
RPM - 6680; EGT - 792; Nozzle Division is minus 1; Fuel Flow - 18,500; Oil Pressure - 50.
Bleed light went out at 5150 RPM.
Also at Military I'm getting EGT and Fuel Flow cycling. 18,200 to 18,600 on Fuel Flow. 788 to 794 on EGT.
On the right side in Military.
RPM - 6650; EGT - 794; Nozzle is minus 1;
Fuel Flow - 18,400; Oil Pressure is 49.
Fuel tank readings - #1 - 15,000; #2 - 13,600; #3 - 16,200; #4 - 10,300; #5 - 12,000; #6 - 13,600.
Dutch 54 ready for takeoff
Going tower frequency.
Calling Edwards Tower
Ready for takeoff

SECRET
SPECIAL HANDLING REQUIRED

Total fuel - 79,200#
Calling Edwards Tower
Dutch 54 ready for takeoff
Roger, I'll take the left side
Calling Edwards Tower
Calling Sport 44
Ready to go in about 1 minute.
Roger, I'll expedite
Oxygen ON
Sport 44 - 54 in 10 seconds
54 on the roll
54 mission frequency
Going to Auto-Nav
I noticed on takeoff roll the left EGT got up to 810. Right EGT (Blocked)
Calling Edwards Approach
.88 Mn, 31,800, 305 KEAS
I let up full A/B
.9 Mn now - 70,200# fuel
Max A/B
1.2 Mn, 67,700#, 445 KEAS, 29,300 ft.
450 KEAS now.
Pitch trim 3½ degrees nose up
450 KEAS, 1.3 Mn, 31,800 feet
Angle of Attack 3 degrees
Fuel remaining 66,000#
Climbing through flight level 33,000 feet.

Bleeding my KEAS off
It's 61,400# (Fuel) - and its 1.6 Mn
Elapse time is 13.
42,800, 430 KEAS
CIP's are 7½ and 8. About ½ psi difference.
Calling Oakland Center
1.7 Mn and going Pos "B" on aft.
Roger Oakland Center climbing through flight level 44,000 and squawking.
1.9 Mn, 48,000, 447 KEAS
Elapse time 15.
CIP's are 818 and 9.3
Fuel remaining 57,900#
Actually about 57,800. It cycled a little.
It cycles occasionally. 57,300 to 57,800#
Its stable now at 57,400#
Mach 2.0 to Auto on the Fwd Doors and 58,200
Now its down to 57,600#
Elapse time is 16.
Looks like its stabilizing out at 57,200#.
Its cycling quite a bit.
2.2 Mach, 442 KEAS, 54,600
CIP's are 10 and 10.3
CIT's are matched at 150.
Elapse time 17.

RPM's are 7200 and 7100
EGT's are 782 and 782
Nozzle's 6 and 5.5.
Fuel Flows are 37,200 and 37,600
Oil Pressure is 45 and 43.
Fuel Remaining 54,700#
Pitch Trim is 3 degrees nose up
Right Oil Pressure is fluctuating quite a bit.
Plus or minus 1 psi
Accelling very good today.
It's pretty warm
2.4 Mn, 440 KEAS, 57,900
CIP's are 11½ and 12
CIT's are matched at 200
Fuel remaining 52,300#
Pitch Trim is 3½ degrees nose up
2.5 Mn, 438 KEAS, 60,550
CIP's are 12 and 12½
CIT's matched at 220
Fuel remaining 50,600
RPM's - 7150 and 7050
EGT's - 774 and 772
Nozzle's 7½ and 7
Fuel Flows - 33,200 and 34,000
Oil Pressure 43 and 42
Coming up on 2.6 Mn. Going to Pos "A" on
Aft Doors.
Elapse time is 22
Both the Aft Door lights are still ON.
Now the right one is out. Left one is still
flickering.
CIP's are 12.8 and 13.3
Mild inlet roughness.
Roger, right on 30 - 35.
Calling Oakland Center
In this turn 35 degrees right bank at 2.7 Mn,
64,700, 426 KEAS
Getting 6 degrees nose up Pitch Trim
Fuel remaining - 46,500#
Calling Seattle Center
Looks like it's rolling us out right on course.
Rolling out on 050 True
At about 2.8 Mn
Elapse time is 27
Going to closed on the Aft Doors
At 44,200
CIP's are now matched at 14.
Ready for left turn.
(Blocked)
This left turn is giving us a bank angle of about
40 degrees.
I'm going to hold it down a little bit
OK it's rolling us out now.

2.94 Mn, (Blocked)
Elapse time is 29.
Rolling us out (Blocked)
I'm going to pull out a little bit.
I have 37,900 at 3.1 Mach, 405 KEAS,
72,500.
Elapse time is 34
CIP's are matched at 18.8
CIT's are at 385.
3.15 Mn - Throttling back
Rolling out on heading 235 True
5 degree Pitch Trim (Blocked)
I have 32,600
How's the temperature back there Jim.
Calling Oakland Center
Dutch 54 above 60,000 and squawking
Now at 3.19 Mn, 82,300, 330 KEAS
CIP's are 12.5 and 13.
CIT's are matched at about 395 - 398.
I have 30,200#. I'll get some tank readings
here.
RPM's are 7100 and 7100
EGT's are 784 and 784.
Nozzles are 7 and 7
Fuel Flows are 17,600 and 17,800
Oil Pressures are 41 and 35.
I'll go thru the tanks - 30,000 total.
#1 - Empty; #2 - 13,500; #3 - 1600;
#4 - 9400; #5 - 5800; #6 - 100.
Angle of Attack is 5.
Trim is indicating 6½ degrees nose up.
Total is 29,200#
I'll turn crossfeed OFF
I'm going to add a little more power.
Theres a lot of fuel in Tank #2.
I had the crossfeed on for a little over
5 minutes.
"R" Bay is 64; "L" is 65; "E" Bay is 65.
Now its 7 degrees nose up Pitch Trim
27,300 # left
3.16 Mn, 80,800 ft., 338 KEAS
Angle of Attack is 4.8
I'll have to back off a little we're
a little over 400°
3.2 Mn, 81,000 ft., 404 - CIT.
CIP's are 13 and (Blocked)
Nozzles 7.2
Fuel Flows 17,500 and 17,900
Oil Pressure 42 and 37
Hydro System is OK
LN_2 - 98 and 95
Fuel Remaining 25,700
Pitch Trim is 7 degrees nose up
Calling Oakland Center

Going to start turn in 72 miles
Calling Los Angeles Center
Dutch 54 squawking
Sun Visor just fell off
Getting a little roll feedback in the stick and its putting me completely out on Pitch Trim.
I've got 21,600
Calling Edwards Approach
Dutch Charlie this is Dutch 54.
Going "A" on the Aft Doors for decel.
Both Doors programmed.
Going decel now.
Elapse time 57.
It's pretty hot up here today. We were pushing that 400 degrees quite a bit.
Above 60,000
In decel: 2.8 Mn, 343 KEAS
76 thousand (Blocked)
Still have 8 degrees nose up trim
Tanks 2 and 4 feeding
19,500# remaining.
How's your temperature.
A little warm up here, but I've got it all the way down.
2.5 Mach I'm going closed on the Aft Doors.
Pitch Trim is 2 degrees up
Fuel remaining 18,700#
Tank #2 - 8,000; #4 - 9300.
All the others are indicating empty.
We're just a little bit east.
Fate 53 - Dutch 54
We're 17 miles south of Beatty now on the 135 Radial. Heading 295.
Roger Dutch 54 - 1, 2, 3, 4, 5, 4, 3, 2, 1,
Turning left to 140
I have a visual on the tanker
Understand 160
You can go ahead and start a descent and accel now
I'm reading 16,000 even
I'm reading 6100 in Tank #1 now.
Have about 5900 in Tank #2.
#3 - 0; #4 - 3500; #5 - 500; #6 - 0.
Total is cycling - 15,200
Fate 53 this is Dutch 54
Receiver is ready
Remind me to check the IFR intercom
54 ready.
Get as much temp out as we can get out.
I'll need another 20,000
Thats all I need - 80,000
Fate 53 - Dutch 54

Thank you very much
We were 80,000 off the tanker.
We were off the tanker at elapse time 137.
80,000#
Ready for our next leg.
Tank #1 - 14,900; #2 - 13,300; #3 - 15,600;
#4 - 9,900; #5 - 11,400; #6 - 14,900.
Total now - 78,300
Calling Edwards Approach Control
Departing the Beatty Refueling Area.
Preceding on our flight plan route
At .88 Mn, 31,300 ft., and I'll go on up
to max A/B.
.9 Mn now - 77,000#
Its 450 KEAS, 28,000, 1.2 Mn and 74,300#
Climbing through flight level 30,000
1.2 Mn my Pitch Trim is 3½ degrees nose up
RPM's at 1.2 Mn are 6800 and 6800
EGT's are 808 and 800
Nozzle's are 3 and 3½
Fuel Flows are 53,800 and 51,400
Oil Pressures are 49 and 45.
Hydro's are 33 and 34 and "A" and "B"
are 33 and 33
CIP's are 8.8 and 9.3
CIT's are matched at 20.
1.4 Mn, 450 KEAS, 35,100 ft.
Programming into a 30 degree left bank.
About 32 degrees.
Good Deal - It sure went nice on the first leg
Flight level 38,000
Calling Edwards Approach
Passing through 39,000
Calling Los Angeles Center
Squawking and at 42,000
Turn the temperature up a little.
1.7 Mn and going "B" pos on the AFT.
CIP's are matched (Blocked)
"R" Bay temperature (Blocked) 40
"E" Bay is 55.
Now she's programming about a 40 degree
right bank.
At 1.97 Mach and going AUTO on the Fwd Doors
CIP's are matched
At Mach 2.0 - 61,800#
2.2 Mach, 448 KEAS, 54,100 ft.
CIP's are 10 and 10.3
CIT's matched at 150.
Fuel remaining is 60,000#
Pitch Trim is 3 degrees nose up
3½ degrees nose up

Angle of Attack is 3½ degrees

Calling Los Angeles Center
We're you calling me
2.4 Mn, 447 KEAS, 57,700 ft.
CIP's are 11.6 and 12.
CIT's matched at 200
Fuel remaining 57,300
RPM's are 7150 and 7100
EGT's are 780 and 780
Nozzles are 7 and 6.9
Fuel Flows are 32,000 and 33,100
Oil Pressures are 43 and 42
Calling Denver Center
Thats affirmative and Ident
2.6 Mn and going Pos "A" on the Aft Doors
Getting a little inlet roughness
446 KEAS, 61,100
CIP's are 13.5 and 14
CIT's are matched at 240
Left Aft Bypass Door light is still flickering
Pitch Trim is 3 degrees nose up
2.7 Mn, 338 KEAS, 64,000
Just swung Tuba City
About 300 to go - 294
2.8 Mn and going Closed on Aft Doors
Lights cycled and there off now
Fuel remaining 52,000
CIP's are 15½ matched
CIT's are matched at 300
RPM's are 7120 and 7060
EGT's are 784 and 790
Nozzles are 8 and 7.5
Fuel Flows are 35,200 and 32,500
Oil Pressure 42 and 40
LN_2's are 90 and 85
Pitch Trim is 3 degrees nose up
Programming into a turn.
15 degrees right bank and it doesn't call for a turn here. It's picking up. Now were doing a little left turn. Only about 5 degrees of turn.
Right CIP is way down so it looks like the right forward door went open.
Closing it manually. Thats what caused the turn.
Calling Albuquerque Center
Above Flight level 60,000 - Ident
3.0 Mach, 395 KEAS, 73,600
CIP's are matched at 17½
CIT's are matched at 375

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Getting some pretty good cycling in Mach here
Call us 3.2 Mn, 44,200 on the fuel
396 KEAS, 74,900 ft.
CIP's are matched at 18.8
CIT's are matched at 400
I'll back off a little
Pitch trim 4½ degrees nose up
Start our turn now
Dalhart's 118 miles
When will we turn.
Rog -
Fuel is 42,200

-END-

A True Transcript

Donald R James
DONALD R JAMES
Major, USAF
Recorder

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FEDERAL AVIATION AGENCY
Air Route Traffic Control Center
P. O. Box 3235, Station D
Albuquerque, New Mexico 87110

January 27, 1966

IN REPLY
REFER TO:

Mr. R. L. Stevens
Box 572
Edwards, California

Dear Mr. Stevens:

As requested by Mr. Stan Ratomsky of our Washington office, we are forwarding you a copy of the recorded conversations regarding the flight of Dutch 54 in the Albuquerque Center's area on January 25, 1966.

We believe that the transcription contains the only information we have that may be pertinent to the accident investigation.

Sincerely yours,

Wm. S. Dalton
Chief, Albuquerque Center

Attachment

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66-I-221

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FEDERAL AVIATION AGENCY

Air Route Traffic Control Center
P. O. Box 3235, Station D
Albuquerque, New Mexico 87110

Albuquerque Air Route Traffic Control Center

Subject: Transcription of conversations regarding Dutch 54

This transcript covers the period from 2111:35 GMT to 2149:35 GMT on January 25, 1966.

The agencies listed below made the transmissions during the period involved. Abbreviations used in the body of the transcript are indicated after each agency.

Albuquerque, New Mexico Air Route Traffic Control Center	ABQ ARTCC
Denver, Colorado Air Route Traffic Control Center	DEN ARTCC
Air Force Dutch 54	DUTCH 54
American Airlines Flight 83	AA83
Trans World Airlines Flight 12	TW12
Delta Airlines Flight 819	DL819
688th ACS/W Squadron, Amarillo, Texas	SLEEPER OCI
Albuquerque Center Sector 14/15 Coordinator	C14/15
Albuquerque Center Sector 2 Coordinator	C2

I HEREBY CERTIFY that the following is a true transcription of the recorded conversation pertaining to the subject accident.

Wm. S. Dalton, Chief
Albuquerque Center

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SECTOR D13 INTERPHONE/RADIO

ABQ ARTCC: three uh D thirteen

DEN ARTCC: say again

ABQ ARTCC: D thirteen

DEN ARTCC: yeah do you have a Dutch five four pending there

ABQ ARTCC: yeah

DEN ARTCC: alright uh his Boulder time is two one one three above flight level six zero zero AB

ABQ ARTCC: WH
(2111:35)

- -

ABQ ARTCC: D thirteen
(2122:10)

DEN ARTCC: Dutch five four from the J fifteen intersection of the center boundary three five miles west five north of the center boundary at uh VFR on top above six zero zero

ABQ ARTCC: radar contact WE

DEN ARTCC: AB

ABQ ARTCC: three uh two one three
(2122:30)

SECTOR R13 RADIO/RADAR

ABQ ARTCC: (2122:45) Dutch five four Albuquerque Center squawk ident

DUTCH 54: Albuquerque Center Dutch five four

ABQ ARTCC: Dutch five four Albuquerque Center roger verify flight level squawk ident

DUTCH 54: roger above flight level six zero zero ident

ABQ ARTCC: Dutch five four roger radar contact

DUTCH 54: (2123:10) roger

SECTOR R14 INTERPHONE/RADIO

AA85: (2130:35) Albuquerque Center this is American eighty five do you have anything on radar off to our right uh looks like some kind of a missile or something uh airplane (unintelligible)

ABQ ARTCC: American eighty five affirmative I do have a radar identified target

AA85: uh what was it some kind of a missile

ABQ ARTCC: American eighty five I'm afraid I can't say

AA85: what do you mean it's a secret deal of some kind

ABQ ARTCC: American eighty five you're free to draw your own conclusions sir

TW12: that's alright American TWA twelve we can't see it either

AA85: well we could see it it's real clear out here

TW12: well we can too I was just being facetious

AA85: okay sir

- -

ABQ ARTCC: (2137:30) Dutch five four Albuquerque Center

ABQ ARTCC: Dutch five four Dutch five four Albuquerque Center over

ABQ ARTCC: (2138:25) Dutch five four Albuquerque Center over

ABQ ARTCC: (2139:05) Sleeper radar Albuquerque

SLEEPER GCI: Sleeper

ABQ ARTCC: do you happen to be talking to a Dutch five four

SLEEPER GCI: uh negative we're not talk talking to any aireraft right now

ABQ ARTCC: alright thank you very much 1G

SLEEPER GCI: uh huh dog mike

SECTOR R14 RADIO/RADAR

ABQ ARTCC: (21:35:10) Dutch five four uh recycle transponder

ABQ ARTCC: Dutch five four Albuquerque Center

ABQ ARTCC: (21:36:00) Dutch five four Albuquerque Center

ABQ ARTCC: Dutch five four Albuquerque Center

ABQ ARTCC: Dutch five four Dutch five four Albuquerque Center over
(21:36:35)

- -

ABQ ARTCC: Dutch five four Albuquerque Center over
(21:41:15)

- -

C14/C15 COORDINATOR POSITION

C2: uh fifteen from two
(21:37:25)

C14/C15: fifteen

C2: yeah where's Dutch at

C14/C15: we've lost his transponder I can't tell you where he is (pause) and also we've lost radio contact

C2: uh what was the last frequency he was on

C14/15: three twenty one three

C2: he was on three twenty one three

C14/15: yes

(unintelligible)

C14/15: RD

C2: that isn't him south of uh no it isn't he's going too slow (pause) ok

C14/13: (21:38:10) RB

C2: (21:43:05) fourteen from two

C14/13: fourteen

C2: yeah you got any more information on Dutch five four

C14/13: no we haven't anything uh we like I have gave you before we lost radio contact and radar he was last on three twenty one three

C2: (21:43:25) ah well what's the ah

C14/13: that other ah (unintelligible) checking also range control at Holloman

C2: ah was he early or late as he went past your positions over there or not or did you lose him before he got there (pause) trying to kind of pin him down on time know where to look

C14/13: uh just a minute

C2: (21:43:55) ok

C14/13 well you got a revision of Anton Chico twenty wait a minute here that's not the right one

C2: yeah I got a twenty eight minute add

C14/15: twenty ah one twenty eight at Anton Chico

C2: twenty one twenty that's right that's what I got yeah

C14/15: well ah he was just two minutes late up here on a previous check so that should be very close on the ah estimate

C2: uh huh so right now he should be somewhere around Tucumcari

(UNKNOWN): who

C14/15: well I I wouldn't say where he should be now

C2: ok thank you

C14/15: RD
(21:44:35)

SECTOR R14 RADIO/RADAR

ABQ ARTCC: TWA twelve Albuquerque
(2147:19)

ABQ ARTCC: TWA twelve Albuquerque Center

TW12: TWA twelve

ABQ ARTCC: TWA twelve what was the uh last time you observed the missile

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TW12: well let's see uh

TW12: (2148:05) uh this is TWA twelve probably uh about twelve thirteen minutes ago we had the vapor trail in sight of course for quite some time

ABQ ARTCC: uh roger uh could you tell from where you were whether it appeared to be descending or not

TW12: well from our position it was hard to tell if it was descending or climbing but uh there were quite a few uh rapid breaks in the trail

- -

BL819: (2148:50) Albuquerque Center Delta uh eight nineteen

ABQ ARTCC: Delta eight nineteen go ahead

BL819: well that was uh probably the uh vapor trail we all also saw and uh I believe we passed it about eight uh minutes ago it was uh uh north of our course

ABQ ARTCC: uh roger could you tell whether he was in uh descent or climb or level

BL819: uh negative uh we couldn't tell it was uh a curved uh track and uh we couldn't tell whether it was uh climbing or uh descending

ABQ ARTCC: (2149:35) roger thank you

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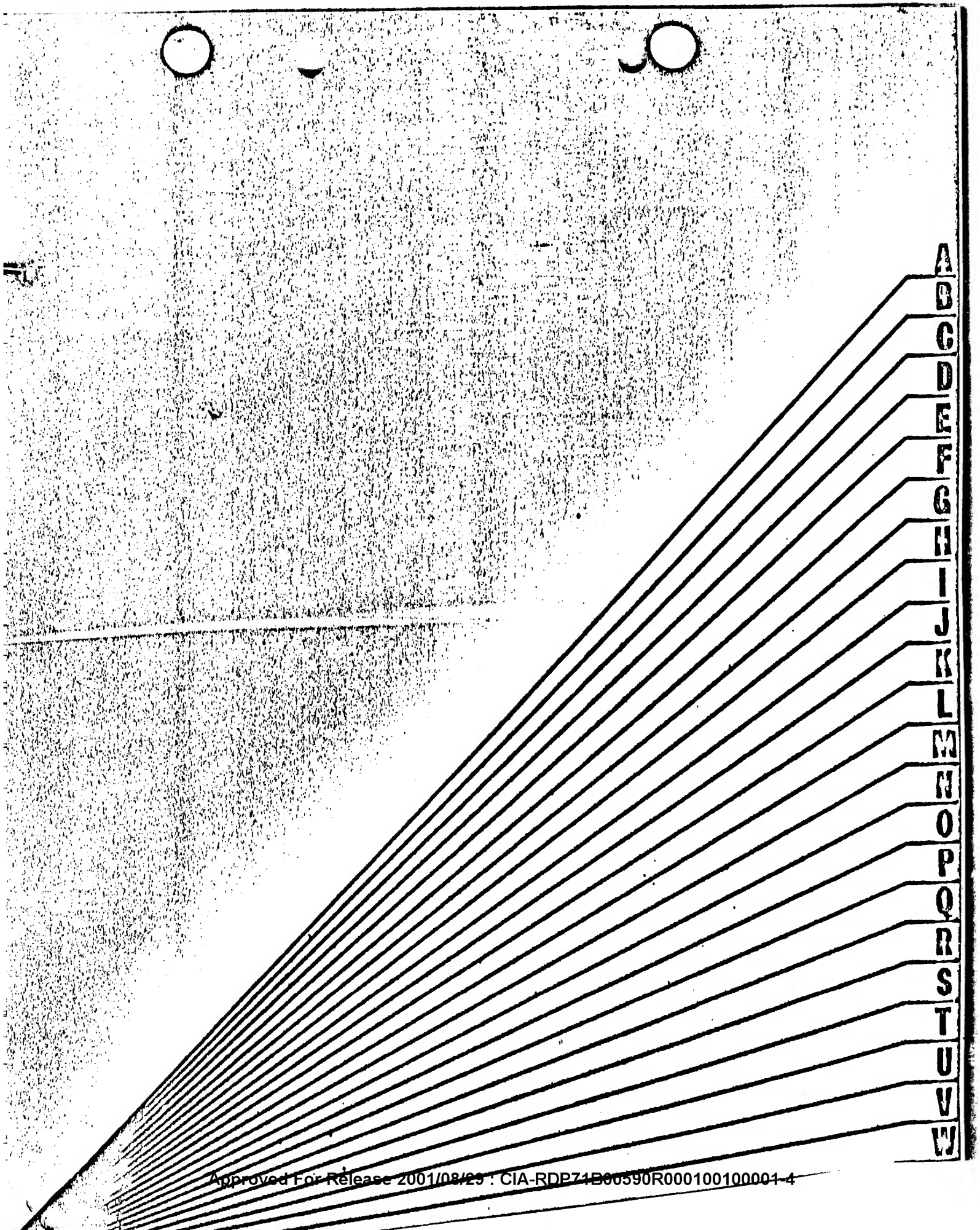

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FLIGHT OPERATIONS AND WITNESS GROUP

Investigation of aircraft accident involving SR-71 serial number 61-7952, production number 2003, which occurred near Bueyeros, New Mexico on 25 January 1966.

A. HISTORY OF FLIGHT

25X1A

25X1A On 25 January 1966, [redacted] pilot and RSO respectively, employed by the Lockheed California Company, were scheduled to fly SR-71 61-7952 on a Category I sensor flight test mission. Call sign was Dutch 54. Two of several pre-established routes (Noah and Eli) were planned for the mission and an air refueling with KC-135 Fate 53 was scheduled in the Beatty Air Refueling Area between the two route segments. Weather conditions were satisfactory for the mission.

Flight planning was completed by the Lockheed Flight Test Engineering Department at Edwards AFB. Crew briefing was in accordance with existing policies and was conducted by the pilot, RSO and mission flight test engineer. The aircraft was preflighted by maintenance crews using established procedures and no discrepancies were noted. The flight crew was dressed on scheduled and taken to the aircraft. Engine start, taxi and all pre-takeoff checks were routine except that a 17 to 18 minutes delay was incurred before engine start to allow for re-alignment of the navigation system.

Takeoff, climb and cruise through the Noah route segment was uneventful. The pilot noted a relatively high pitch trim position during this cruise, indicating a CG position farther forward than desired. He used the cross-feed system to move CG aft. There was no indication of a fuel system sequencing problem. Deceleration and rendezvous with the tanker was according to the flight plan.

The air refueling was completed and the SR-71 departed the tanker with full fuel tanks, an indicated total of approximately 80,000 pounds. The aircraft departed the refueling area and started acceleration for the Eli route segment. The roll axis and Auto-Nav modes of the autopilot were engaged after refueling was completed but the pitch axis was controlled manually. During acceleration and climb, the aircraft performed normally and pitch trim indication was noticeably lower than on the preceeding leg. At approximately 2.9 Mach, the aircraft yawed and rolled into a 20 degree right bank. The pilot noted the right CIP to be 4 psi below the left so he changed to a manual control schedule of the right forward by-pass door for the remainder of acceleration and cruise. Because of CIT limitations, cruise was stabilized at 3.15 Mach between 77,000 and 78,000 feet. Approaching the turn at the east end of Eli (west of Bueyeros) the pilot added a little power so as to maintain altitude through the turn. The turn was started at 77,482 feet and approximately 3.16 Mach. Fuel load at the start of turn was 42,200 pounds and pitch trim at 2.8 nose up. This computes to a CG of 26.7%, see attachment to this report

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The aircraft entered a right turn as programmed through the Auto-Nav system. Bank was established at approximately 35 degrees and after 15 to 20 degrees of turn, the right engine inlet unstarted. Bank immediately increased to about 60 degrees and the pilot countered with left aileron to stop the roll. Use of rudder by the pilot to aid roll control cannot be determined. The pilot stated that he thought of having to use both inlet restart switches but he has no conscious recollection of actuating them. He attempted to lower the nose and reduce the angle of attack by forward stick force but the nose started up at an increasing rate. The last stick position that the pilot remembers is in the forward left corner. No decrease in the bank angle was noted until the nose started up, and then the nose went into a very rapid pitch up. Pitch angle increased to a point where all the pilot could see was blue sky and at this point he apparently lost consciousness.

The pilot regained consciousness while he was descending to the main parachute deployment altitude with the stabilization chute operating normally. After the main chute opened, he actuated the survival kit and opened his face plate. The landing was relatively mild and after landing he was assisted in getting out of his equipment by a rancher who flew his helicopter to the landing point. The rancher checked the RSO and determined that he was dead. He then flew the pilot to the hospital in Tucumcari, New Mexico for treatment.

B. ANALYSIS OF WITNESS STATEMENTS

There were a considerable number of persons who observed the final stages of the fall of aircraft wreckage and the descent by parachute of the two crew members. The witnesses were generally inexpert in the field of aviation and none could see the aircraft during the pitch-up and disentegration phases of the flight. Four statements are included under Tab N; however, no significant information relative to the cause of the accident can be found in the statements. [redacted] gave STATOTHR information concerning his assistance to the pilot after landing and is discussed in the medical report of this accident.

C. SIMULATOR STUDIES

1. A series of tests were conducted on 1 and 2 February 1966 using the SR-71 flight simulator at Beale AFB. The purpose of these tests was an attempt to duplicate the aircraft and flight conditions which existed at the time of the accident and the maneuvers which resulted in loss of control in order to determine the reason for loss of control and whether or not it could have been prevented.

25X1A

25X1A 2. Participating in the tests were: [redacted] (LAC pilot); [redacted]; Col Templeton (SR-71 PSO); and Lt Col Daniel (SR-71 Test Operations). With the exception of Col Templeton, each of these pilots has flown the SR-71. Col Templeton has flown the YF-12. Observing and recording the tests were Lt Col Rothwell (Directorate of Aerospace Safety) and Mr Hoey (AFFTC Performance and Stability Engineer).

3. Test conditions were as follows: Aircraft gross weight 100,000 pounds; speed 3.15 Mach; altitude 77,000 feet; 35 degree right bank in a shallow climb; right forward inlet bypass doors set manually to match the left CIP. Each pilot flew one test at 25% CG, 26% CG and 27%CG. After initial conditions were established, the right inlet was unstarted and the pilot attempted to recover the aircraft from the ensueing maneuvers. Data from the tests was recorded and can be seen in the attachment to this report in Tab W. In general, the results of the tests showed that at 25% CG little difficulty was encountered in recovering the aircraft; at 26% CG recovery was marginal; and at 27% CG recovery either could not be effected or, if a momentary recovery was effected, the aircraft was lost immediately when the pilot's attention was diverted momentarily from the task of maintaining pitch control. [redacted] stated that STATOTHR the simulator test at 27% CG appeared to duplicate very closely the maneuvers which resulted in his loss of control in the actual aircraft.

4. Further tests were conducted at the 27% CG condition with the following results. (1) With zero pitch rate an angle of attack of 10½ degrees could be maintained with full forward stick. (2) Above 10½ degrees angle of attack a zero pitch rate could not be maintained with full forward stick and the angle of attack continued to increase. (3) With a pitch rate of less than one degree per second the aircraft would continue to pitch up, out of control, if full forward stick was applied after 7½ degrees angle of attack had been exceeded (Note: At these flight conditions the angle of attack was 4½ degrees for level flight and 6 degrees in a 35 degree bank). (4) Pitch rates in excess of one degree per second resulted in immediate loss of control. (5) By giving maximum attention to the angle of attack and pitch attitude the aircraft could be controlled, however, a momentary distraction from these instruments resulted in loss of control. (6) Pitch rates and angles of attack which would cause loss of control were so small that they were not readily apparent to the pilot during a normal instrument cross check. Additional tests were conducted with the pitch stability augmentation system failed and although the aircraft was more difficult to control, the results at each CG were essentially the same.

5. The general opinion of the pilots participating in these tests was that the simulator accurately depicts the aircraft handling qualities and flight characteristics in all areas except roll response. The roll response to a roll command was felt to be too high. However, they were unanimous in their opinion that this did not affect the validity of the tests. The SR-71 flight simulator employs two Mark I digital computers for continuous solving of flight, propulsion, navigation, communication and accessory equations to achieve as close a simulator-to-aircraft performance relationship as possible. The Mark I computer receives analog and Boolean inputs from the cockpit controls and switches, converts the analog inputs to digital form, performs the required computations, and converts the results into analog signals. These signals control the simulator to provide realistic response in accordance with the aircraft's performance characteristics. The cockpit controls, switches and displays are exact duplicates of the aircraft. A motion system imparts a realistic sensation of flight maneuvers.

6. Additional simulator studies conducted at AFFTC are included as an attachment to this report.

D. INVESTIGATION AND ANALYSIS

1. Lockheed California Company pilots assigned to ADP are not subject to standardization/evaluation flight checks by AFSC Contract Management Division. Further, there are no requirements for flight evaluation of these pilots by existing contracts as far as could be determined.

2. Investigation of the wreckage by the maintenance investigation team and evaluation of known facts and circumstances revealed that structures, flight controls, engines and afterburners, all aircraft systems, ruptures, or fire and explosion were not factors in this accident. All damage occurred after the aircraft entered a statically unstable flight regime.

3. A group of four qualified pilots including the pilot involved in the accident conducted a series of tests in the SR-71 flight simulator. It was determined that the simulator control response approximated the aircraft sufficiently to validate the tests. Specific results are discussed in paragraph C of this report. Overall results showed that the probability of recovering the aircraft from the conditions to which it was exposed was virtually nil.

E. FINDINGS

1. The crew was qualified, current and proficient in SR-71 aircraft and was on an authorized flight.

2. There is no standardization/evaluation program in effect for Lockheed California Company ADP pilots, nor are adequate records of flying activity and training being maintained.

3. AFCS facilities and weather were not factors.

4. Flight planning and briefing were adequate for the mission and in accordance with existing polcies.

5. Aircraft preflight by the ground crew was in accordance with existing maintenance directives.

6. DD Form 365F is not used nor is there an equivalent form in use for recording weight and balance data. A form titled R-12 Flight Loading Sheet is used to record loading of all serviced items with resulting gross weight and CG. The form does not provide cross-check procedure for fuel loading to assure desired loading and distribution in the aircraft.

7. The pilot and RSO operated the aircraft in accordance with Flight Manual procedures and the test plan from time of entering the cockpit until the aircraft became uncontrollable.

8. There is no accurate and direct means to show the pilot CG location, nor are there provisions for manually moving fuel rapidly aft, as well as forward, to set a desired CG for various flight conditions.

9. The aircraft entered a turn using an Auto-Nav programmed 35 degree bank at 3.15 Mach and 77,842 feet altitude. CG was approximately 26.7% which is aft of the authorized aft limit of 26.5% for supersonic flight. The right engine unstarted shortly after the turn was established and the aircraft immediately rolled to approximately 60 degrees of bank.

10. The aircraft did not respond to aileron forces to correct the bank nor did it respond to forward stick forces to lower the pitch attitude and decrease angle of attack. A pitch rate developed, the aircraft pitched-up and began to disintegrate due to forces beyond the design criteria.

11. The pilot experienced complete loss of control when the aircraft entered a statically unstable regime in which a disturbance in the pitch axis resulted in development of a pitch rate which could not be controlled.

F. RECOMMENDATIONS

1. A standardization/evaluation program should be established for Lockheed ADP pilots and crew members, and adequate records of flying and training maintained.

2. The R-12 Flight Loading Sheet should be revised to provide cross-check procedures for fuel loading to assure that the desired fuel quantity is loaded and distributed properly. The revised form should also provide for computation and recording of necessary weight and balance data. DD Form 365F should be used.

3. Aircraft CG, speed and altitude limitations should be changed to provide a greater safety margin until proper flight parameters, procedures and equipment are studied and necessary changes made to provide a safe operating envelope.

4. An accurate, direct reading CG indicating system should be installed in the cockpit to show the pilot exact CG location.

5. The fuel system should be modified to allow rapid aft, as well as forward, movement of fuel in order to establish optimum CG for the flight conditions.

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SR-71 Test Force

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AFFTC Engineering Branch

SECRET
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STABILITY STUDY - ATTACHMENT

TO FLT OPS & WITNESS GP REPORT

Static Stability in Pitch

A longitudinal trim curve for the SR-71 at 370 KEAS and Mach 3.15 is shown in Fig 1. The two curves for 25% and 27% C.G. positions are based on contractor wind tunnel and estimated flexibility data (Ref LAC-SP-508). Notice that these curves indicate positive stability below approximately 5° angle of attack (C_L = .13), that is, increasing trailing-edge-up elevator (back stick) is required to change from a low angle of attack to a higher one. Above approximately 5° angle of attack the airplane exhibits increasingly negative static stability which will result in pitchup if no corrective control action is applied. Since the elevator effectiveness is relatively high in spite of the low level of static stability the pitch damper (especially the 'lagged pitch rate' system) is quite effective and will maintain a nearly constant pitch attitude even under conditions of mild static instability. At higher levels of instability or if the unstable region is approached with a nose up pitch rate the SAS system will oppose the pitch up tendency but will be unable to reduce the pitch rate to zero and thus pilot action will be required to prevent pitchup. At aft C.G. conditions the level of static stability is reduced at all flight conditions and thus the critical angle of attack for pitch-up is also reduced.

The lift coefficient as computed for the flight conditions reported by the pilot just prior to the start of the turn is shown by the arrow in fig 1. Notice that any increase in angle of attack or nose up pitch rate as might be expected at the initiation of a turn would place the airplane well into the unstable pitch-up region especially for an aft C.G. condition.

Lateral Control Power

At the flight conditions under consideration (3.15 Mach number, 370 KEAS) the SR-71 exhibits a relatively low level of lateral control power even under normal flight situations. A condition of thrust asymmetry as experienced during an unstart will produce a steady state sideslip which is roughly proportional to the difference in thrust between the two engines. This sideslip will result in a steady state roll as produced by the airplane dihedral effect unless controlled by aileron or rudder. The solid line in fig 1 describes the flight condition where the rolling moment produced by sideslip is exactly balanced by full aileron deflection. Also shown are estimated sideslip values for 100% and 50% thrust variation between engines (yaw damper on). For conditions above and to the right of the cross hatched line the airplane will continue to roll into the dead engine even with full opposing aileron.

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Pitchup Description

The pilots description of the maneuver causing the accident can now be fully explained based on the predicted longitudinal stability and lateral control power for the SR-71. A slight amount of back pressure on the stick was apparently applied by the pilot at the start of the turn. The resulting nose up pitch rate and increase in angle of attack placed the airplane into the unstable angle of attack range where the SAS was unable to completely stop the pitch rate. Angle of attack therefore continued to increase slowly throughout the ensuing maneuver. At approximately 8° angle of attack an unstart occurred on the right engine distracting the pilot from the gradually increasing angle of attack. The airplane rolled into the unstarted inlet and the pilot applied full corrective aileron. The angle of attack at this point was apparently 8 to 10° and the fully applied aileron was ineffective in righting the airplane (fig 1). This further distracted the pilot from the increasing angle of attack. When the pilot realized that the airplane had attained a significiant nose up pitch rate and applied full forward stick the airplane had exceeded a controllable angle of attack and an uncontrollable pitchup occurred.

Results of AFFTC Simulator

All of the pilots who flew the Beale simulator also flew the AFFTC SR-71 simulation which had been mechanized to assist in the Cat II test program. All of the participating pilots felt that the roll response of the AFFTC simulation was much closer to the actual airplane than was the Beale simulator. Although the pitchup symptoms were similar in both simulators the pilots found that they could control the pitchup better in the AFFTC simulator. They attributed this to the low pitch stick force gradients (approximately 1/3 of actual), lack of breakout forces and the unrealistic cockpit presentation. The lower lateral response also appeared to reduce the tendency for the airplane to couple from inadvertent roll inputs as was noticed in the Beale simulator. The pilots felt that in general the AFFTC simulator verified the conclusions reached after flying the Beale simulator with regard to conditions causing the accident.

The AFFTC simulator was also used to attempt to match the pitch, roll and yaw angle data obtained from the ANS. A time history of the best match is shown in fig 2. If it is assumed that the rate of climb and sideslip remained approximately constant during the first few seconds of the turn (prior to the unstart) then angle of attack alone can be varied to match the three measured attitude angles. This simulated data verifies the contention that the angle of attack began to increase at the initiation of the turn and continued to increase gradually until an uncontrollable pitchup occurred.

Robert G. Hoey

ROBERT G HOEY
AFFTC Engineering
Branch

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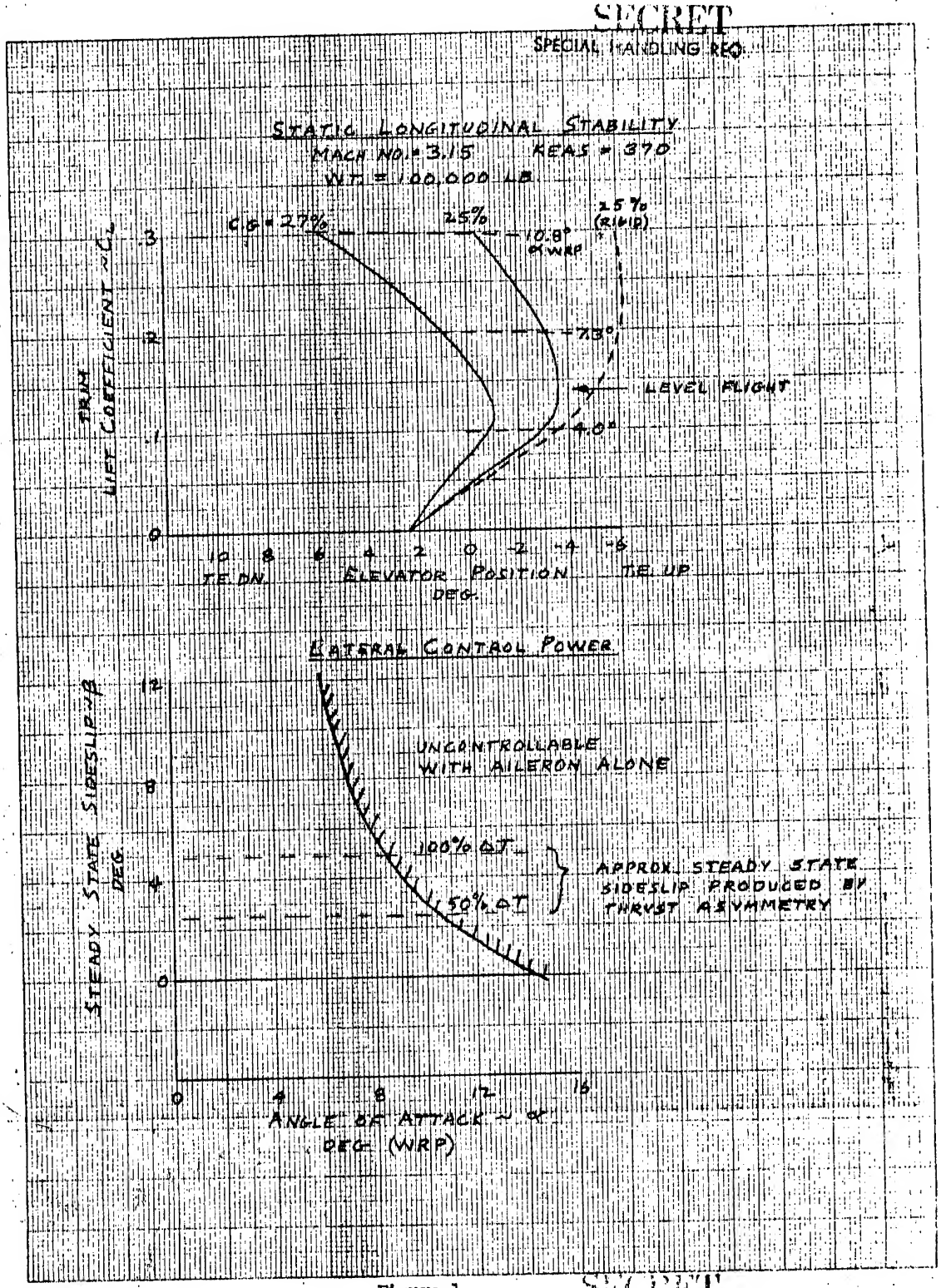

Figure 1

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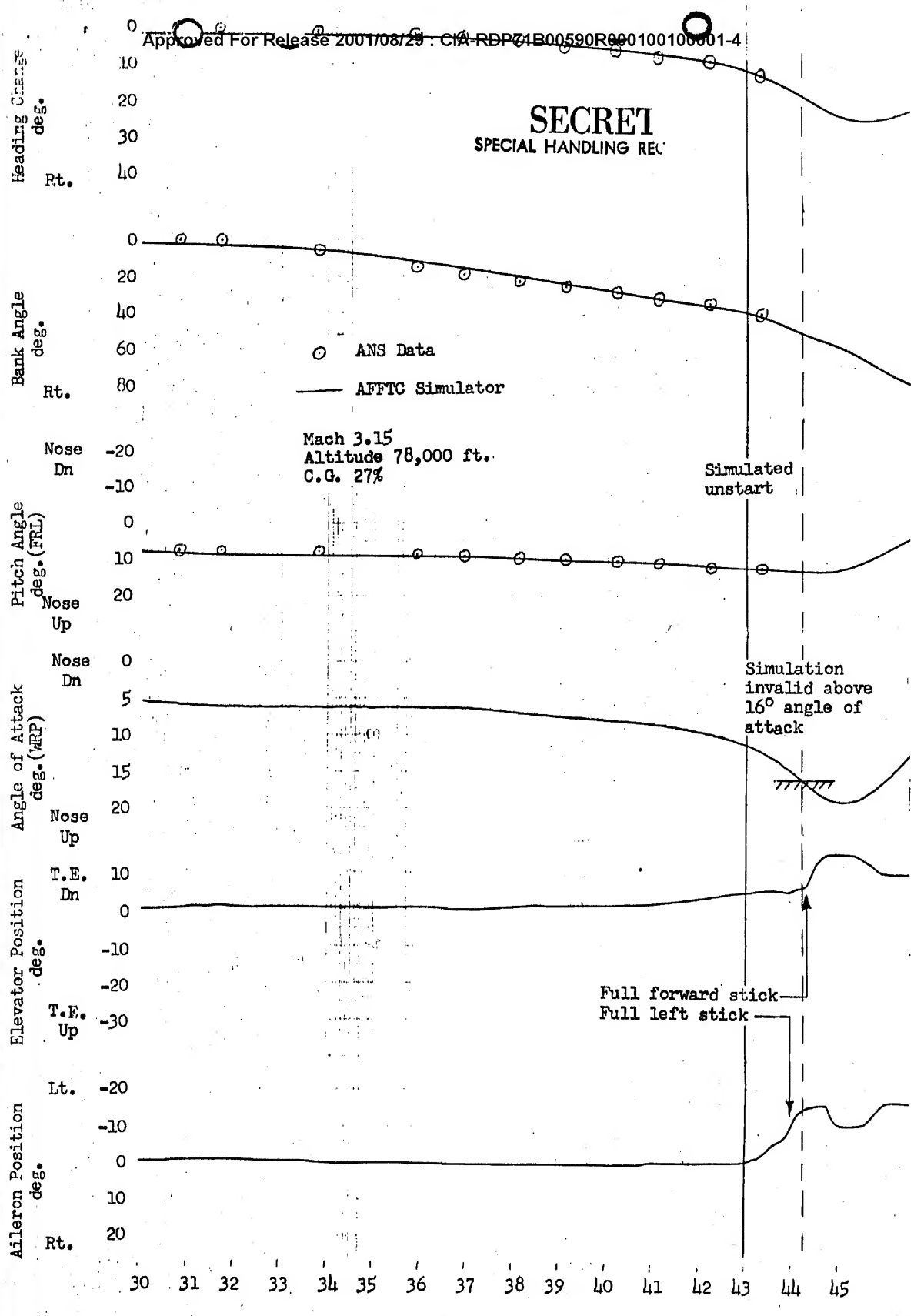

Figure 2

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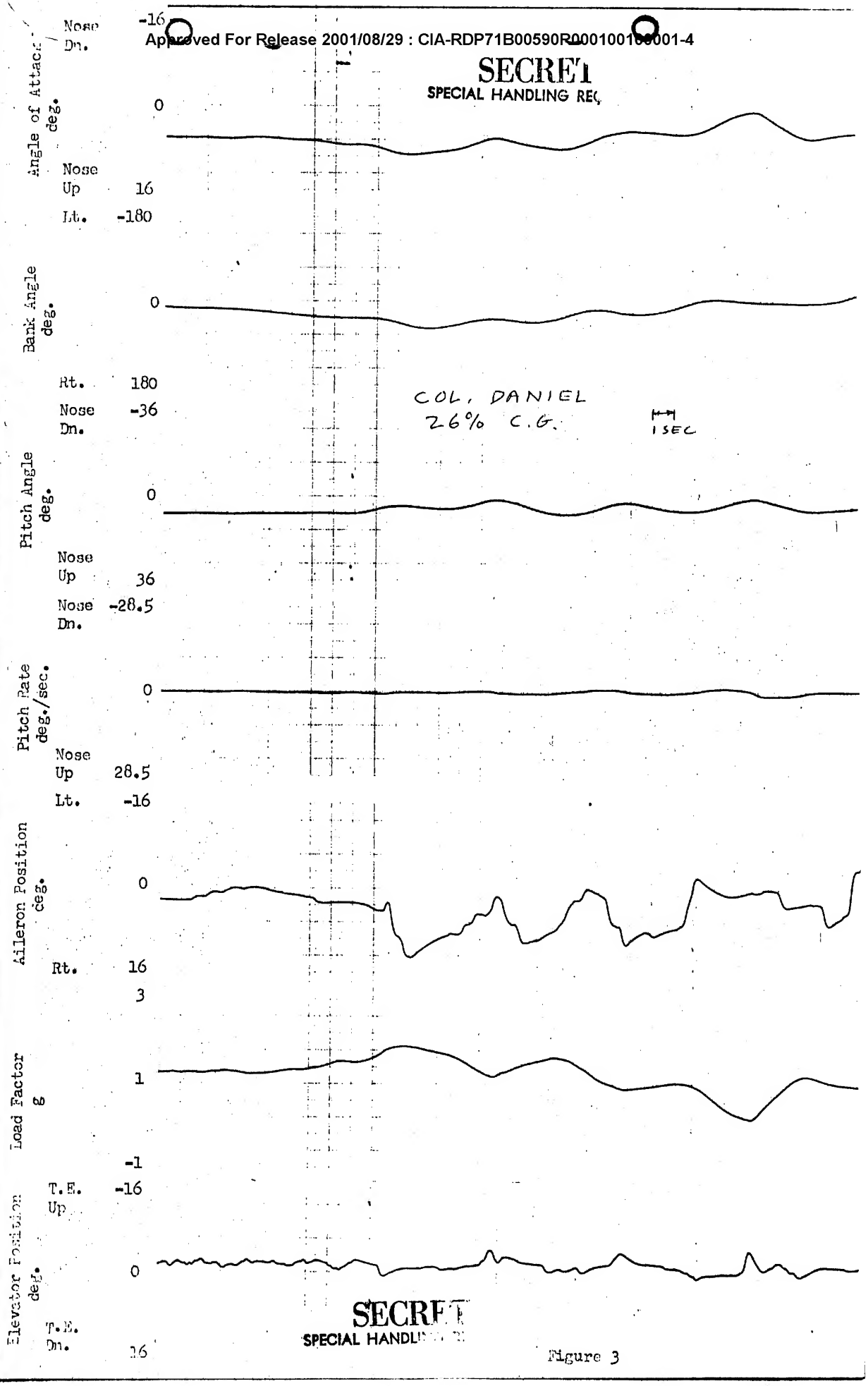

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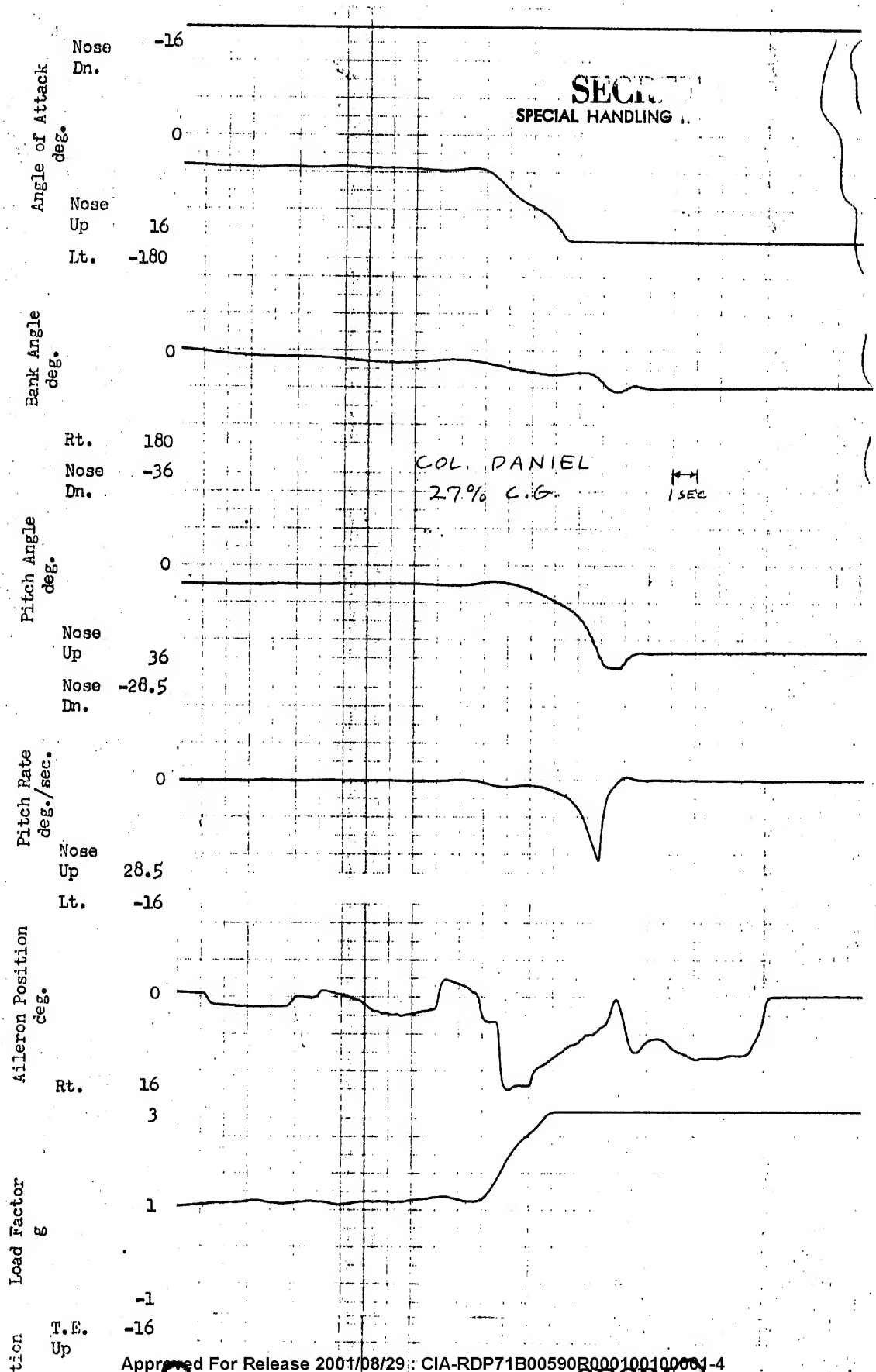
Figure 3



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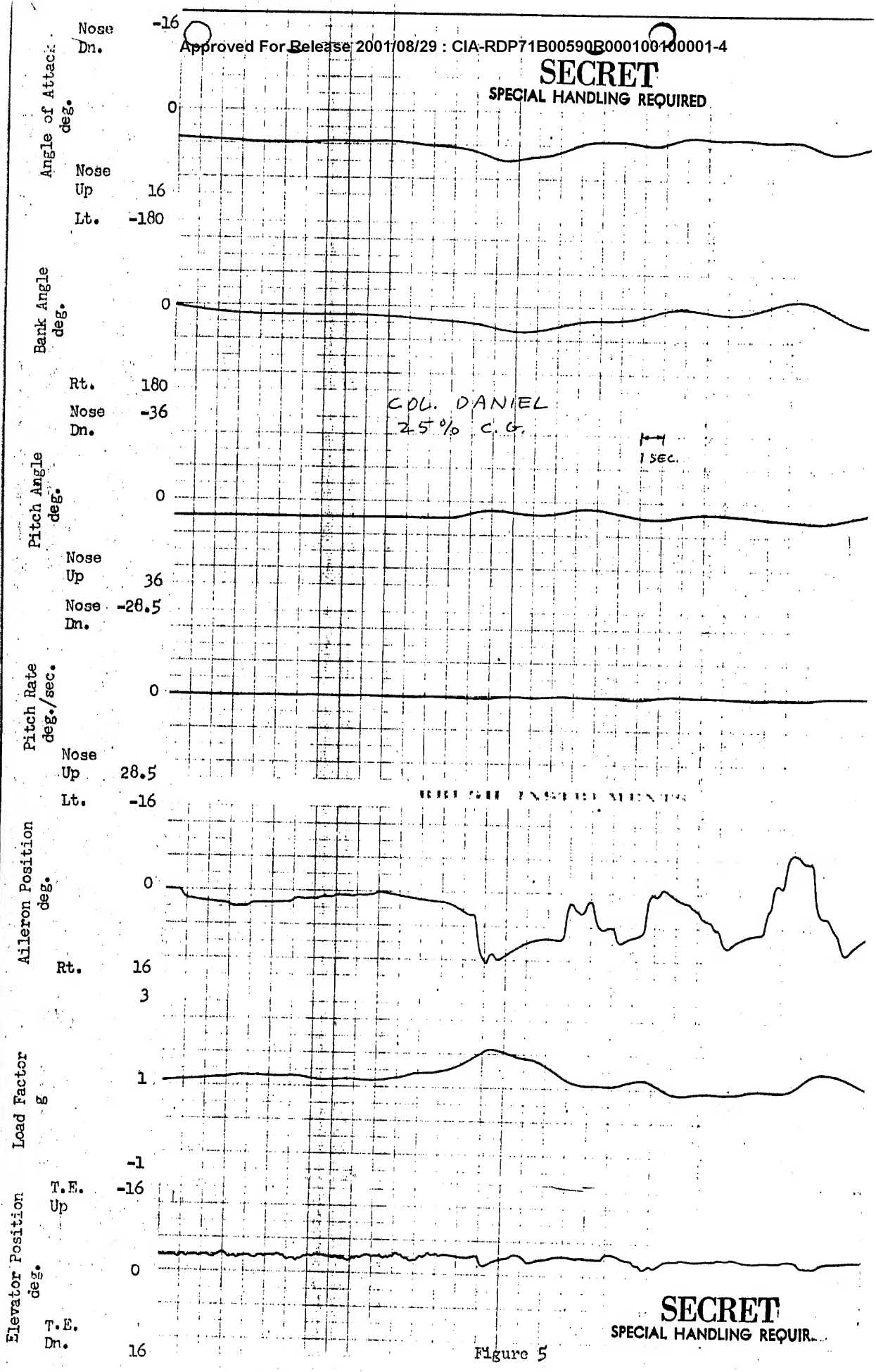

Figure 5

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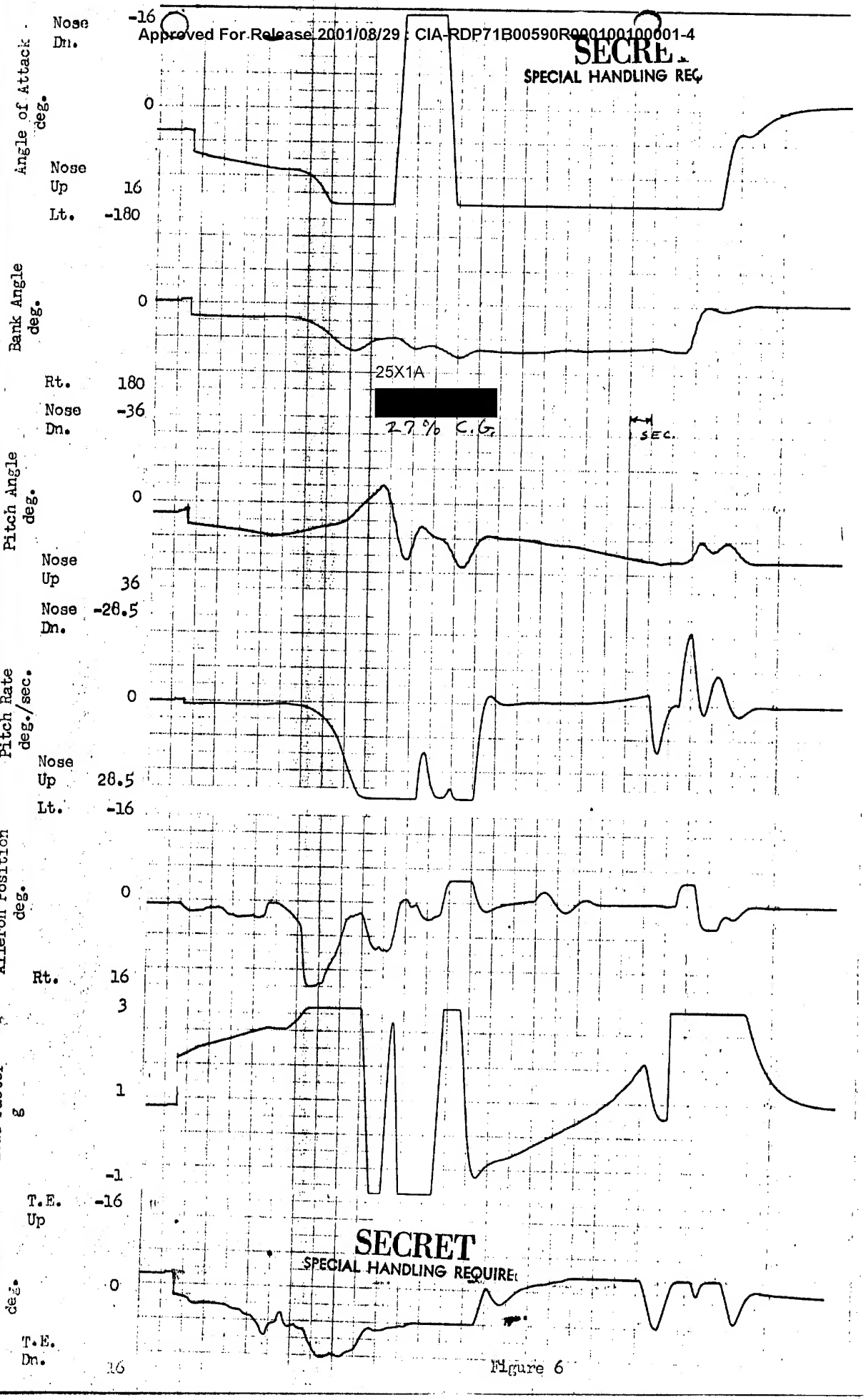

Figure 6

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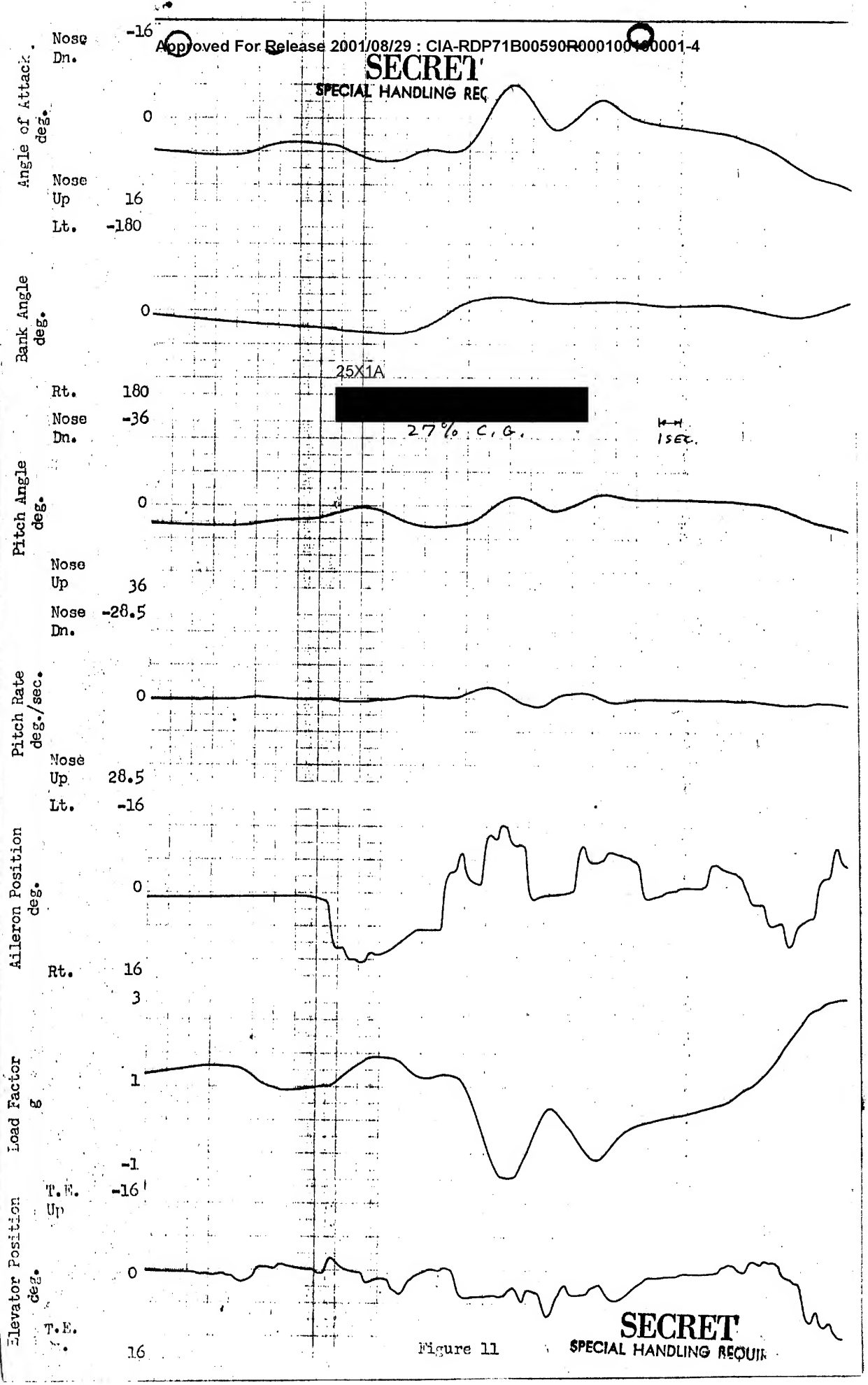

Figure 11

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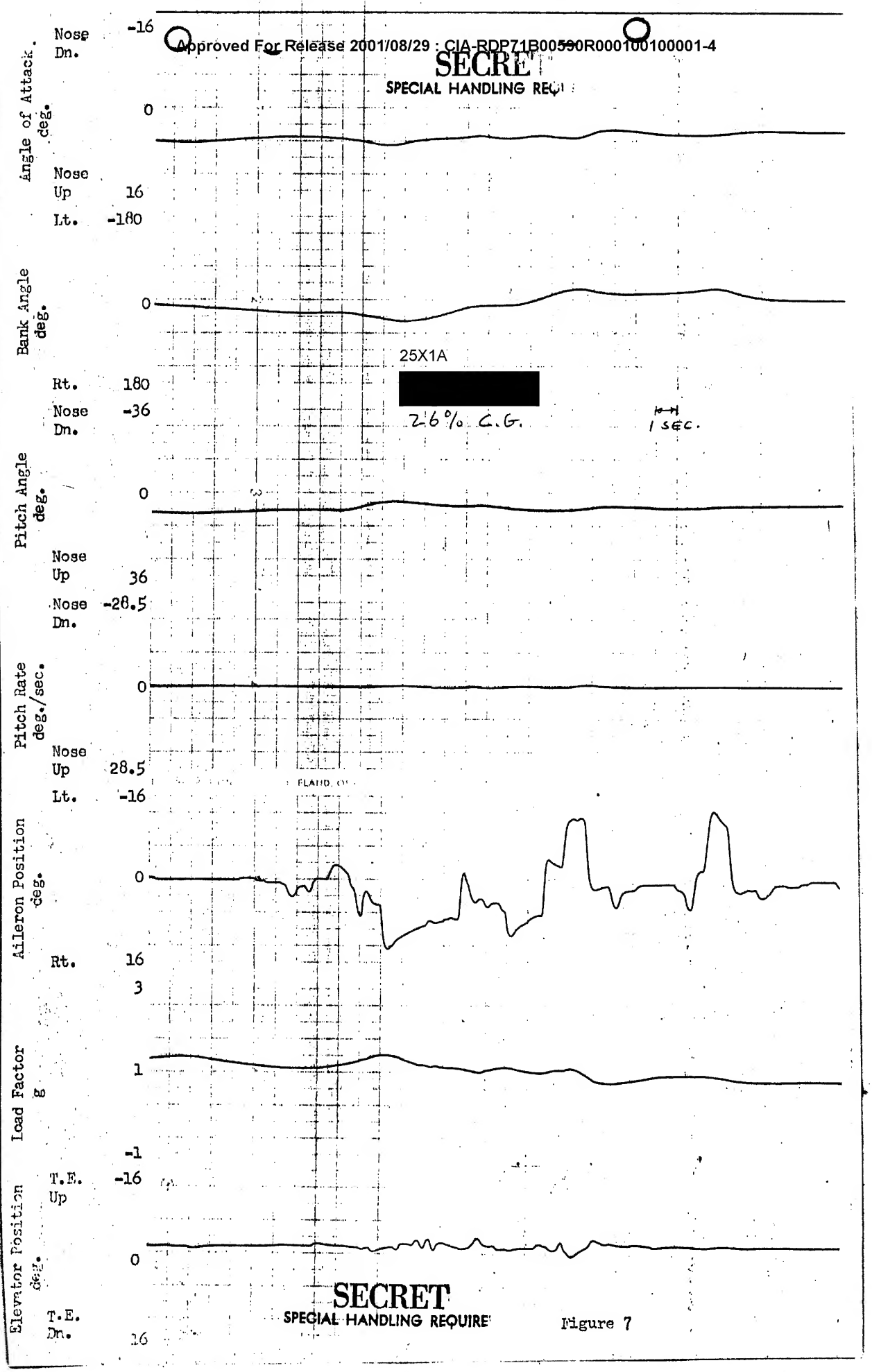

Figure 7

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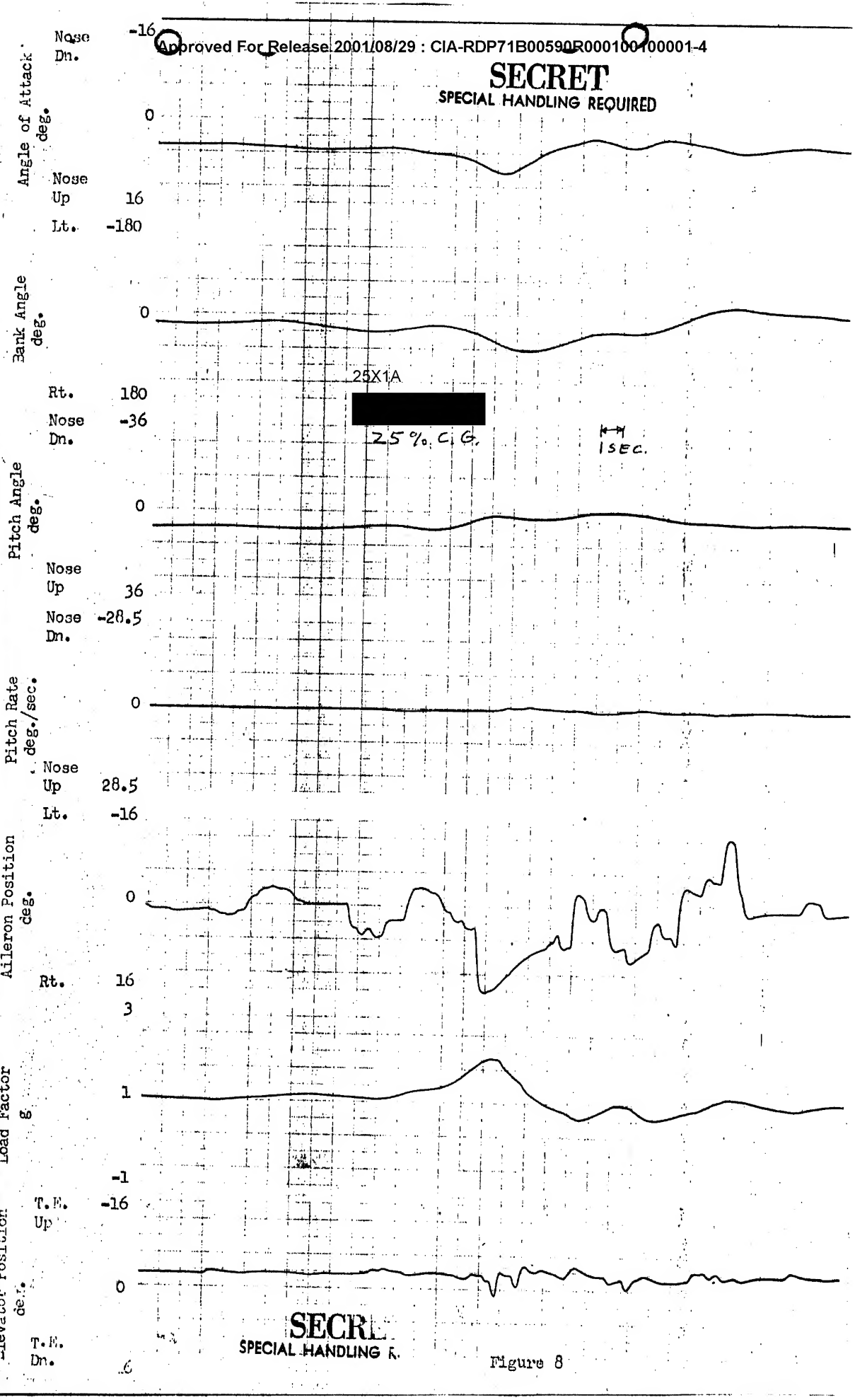

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Figure 8

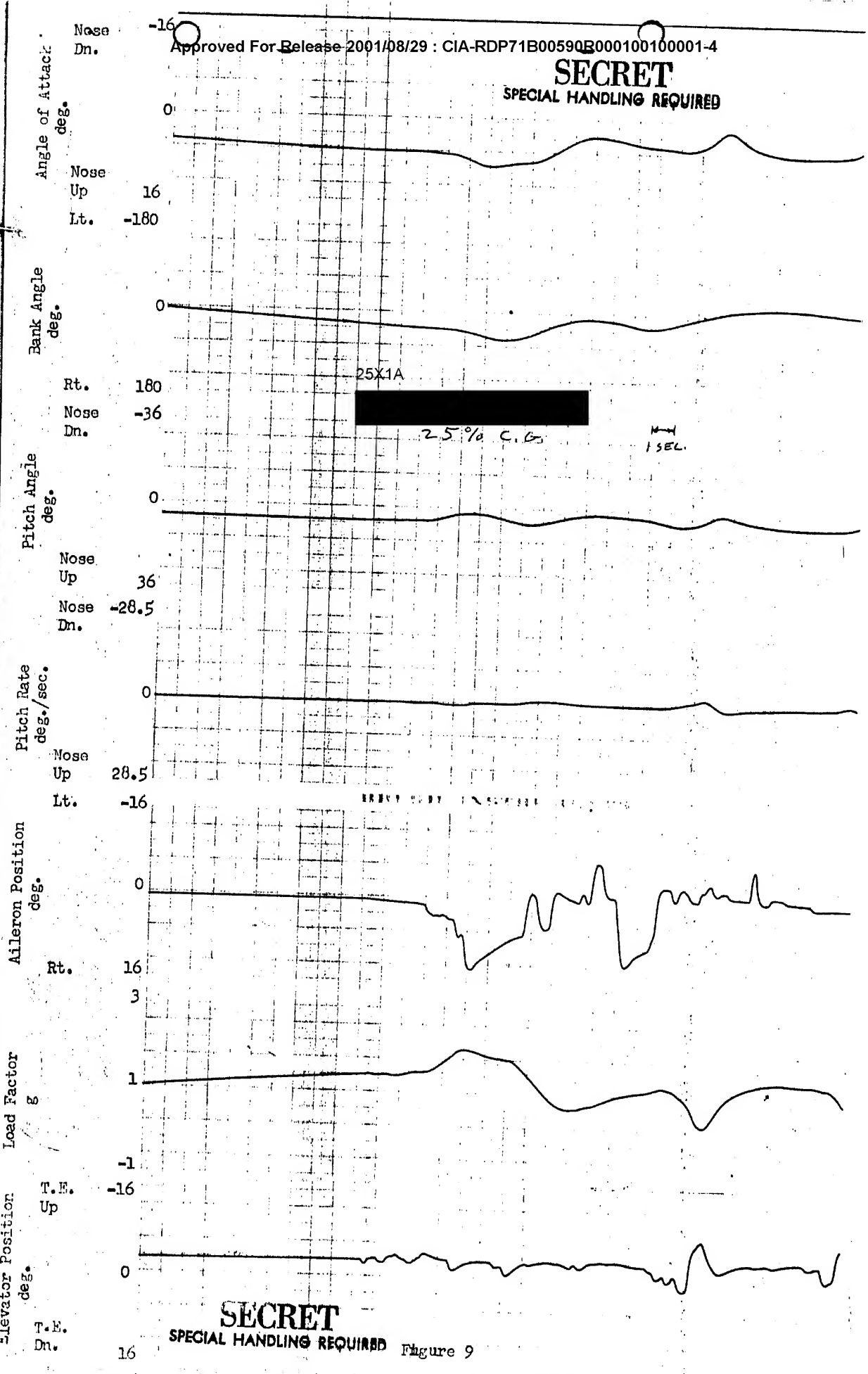

Figure 9

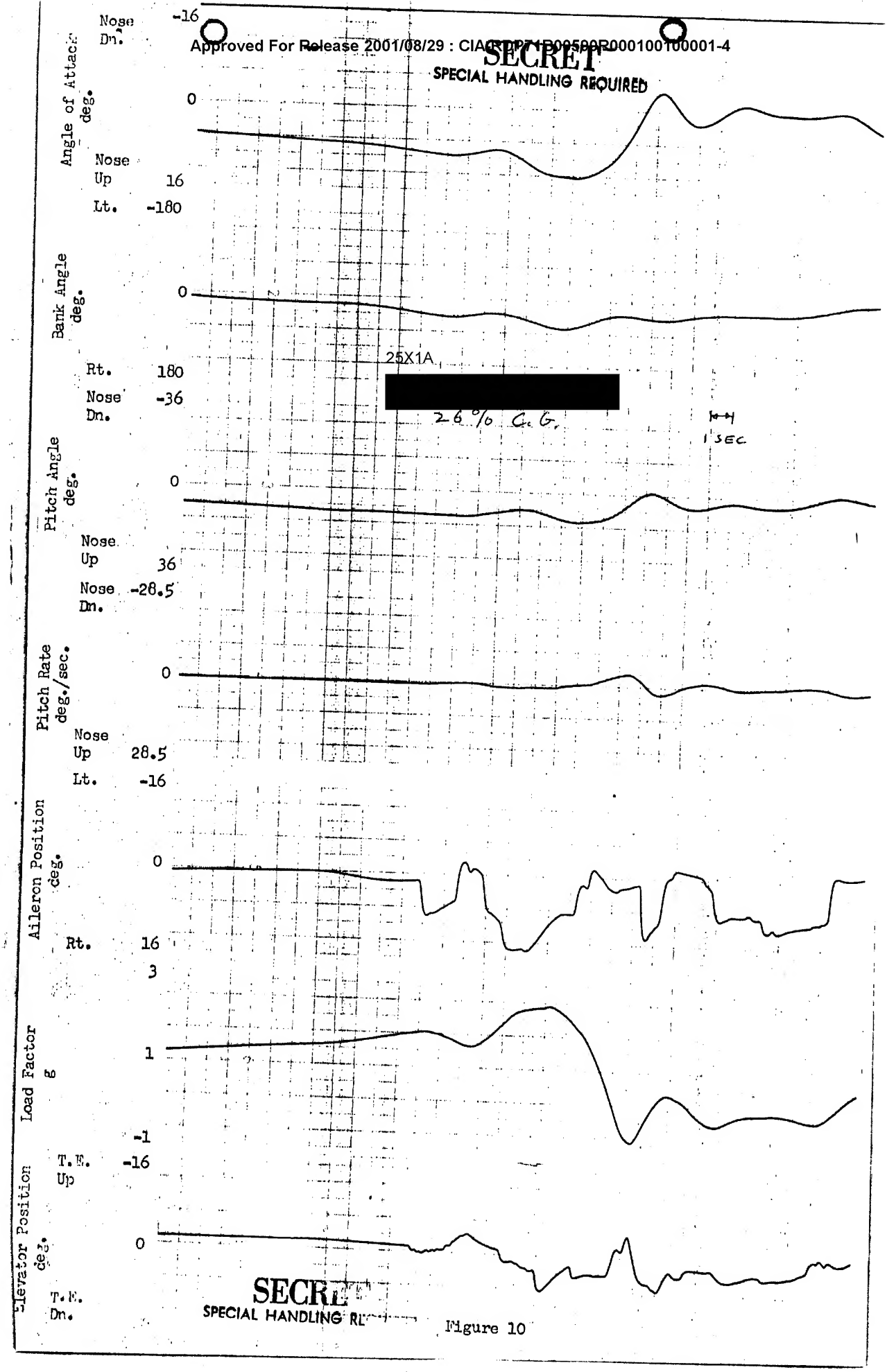

Figure 10

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C.G. CALCULATION

Zero fuel weight	-	58,449
C.G.	-	22.3%
Fuselage station	-	887.8"
Moment index	-	104.6
Tank 1 RH shutoff	-	4500#

A. RAMP LOAD (CALIBRATED)

1 - 14,900
2 - 13,100
3 - 16,000
4 - 9,750
5 - 11,200
6 - 14,900
79,850
58,449
138,299 Ramp Gross - Ramp C.G. = 21.4%

B. PRIOR TO T.O.

Gauge	Calib
1 - 15,000	14,600
2 - 13,600	13,100
3 - 16,200	16,000
4 - 10,300	10,100
5 - 12,000	11,200
6 - 13,600	10,900
	75,900
	58,449
	134,349 C.G. 20.3%

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C. PRIOR TO A/R (Guage Readings)

1 - 0

2 - 13.5

3 - 1.6

4 - 9.4

5 - 5.8

6 - .1

30,400

58,449

G.W. 88,849 C.G. 24.1%

D. AFTER A/R (Guage Readings)

1 - 14.5

2 - 13.3

3 - 15.6

4 - 9.9

5 - 11.4

6 - 14.9

79,600

58,449

G.W. 138,049 C.G. 21.9%

E. Assuming no forward transfer or crossfeed operation, the c.g. at the last recorded fuel reading can be computed in accordance with procedures contained in T.O. 1-1B-40, dtd 15 Dec 1965.

1. From A/R until Tank 1 R.H. shutoff: (minus 20,000# fuel)

Tank 1 - (-) 10,000

Tank 3 - (-) 5,200

Tank 6 - (-) 4,800

Remaining:

1 - 4,500

2 - 13,300

3 - 10,400

4 - 9,900

5 - 11,400

6 - 10,100 (6A Full, 6B 2300#)

59,600#

58,449

G.W. 118,049 C.G. 26.4%

2. From Tank 1 R.H. shutoff until 42,200# remain. (Minus 17,400#)

Tank 1 - (-) 3,650

Tank 3 - (-) 5,050

Tank 6 - (-) 8,700

- 17,400

Remaining:

1 - 850

2 - 13,300

3 - 5,350

4 - 9,900

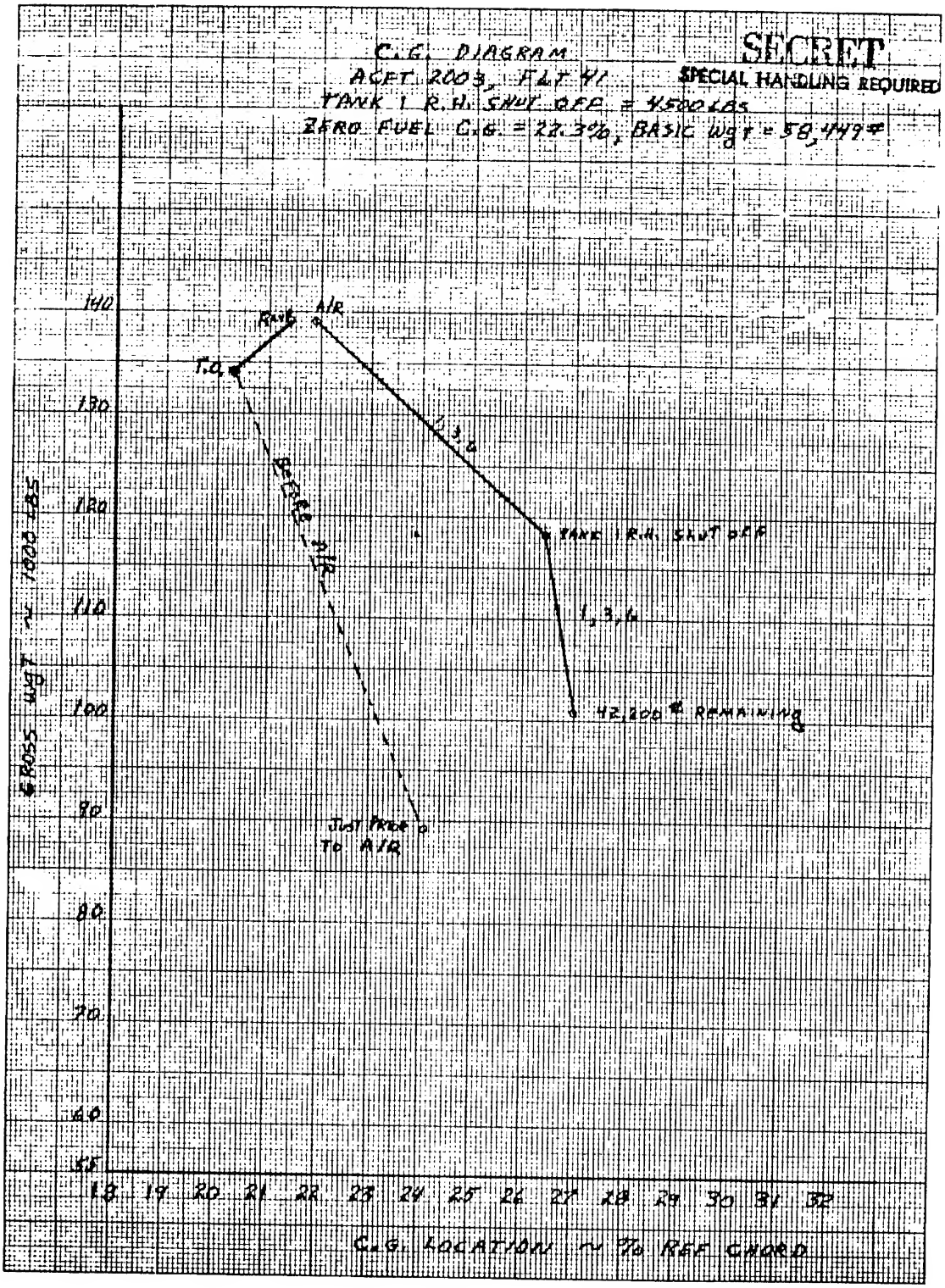
5 - 11,400

6 - 1,400 (All in 6A)

42,200

58,449

G.W. 100,649 C.G. 26.7%



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STRUCTURAL, FIRE, AND EXPLOSION INVESTIGATION PERTAINING TO SR-71-A, S.N. 17952, ON THE 350° RADIAL/107 NM, CANNON AFB, NEW MEXICO, 25 JANUARY 1966

Except for small parts of chine honeycomb and miscellaneous small parts the aircraft broke into two sections. The forward part of the fuselage, from the pitot static boom to approximately station 535 was in one piece upon contact with the ground. This part of the aircraft came almost straight down in an inverted position. The impact broke the pitot static boom and the forward part section at approximately station 240, which is the manufactured joint. There was observed no in-flight fire nor ground burning. The impact with the ground smashed the upper surface inward. Examination of the fractures of the skin and the load carrying longitudinal members at the separation point, station 535, revealed quite definitely that the forces acting on this forward part of the fuselage were in a direction mostly upward and slightly to the right. This was evident since the two lower longerons on the bottom of the fuselage failed in tension with a slight burr on the right edges of the right longeron, the skin failure in 45° shear at the line of rivet holes, the compression buckling of each side longeron and heavy brinelling of the fracture surfaces, the compression buckling of the top center longeron and the heavy brinelling of the fracture surface, and the clear "saw-tooth" tear of the upper left skin which again indicated final upward separation and movement to the right. Examination of the corresponding fractures and deformations on the front part of the rearward fuselage at station 535 corroborates the evaluation on the forward part. Even more pronounced is the skin corrugation of the upper surface on the forward part of the fuselage which is due to the compressive force as the forward part of the fuselage deflected upwards. This also caused buckling of the upper longerons.

Evaluation of these observations results in the conclusion that this structural failure has to be the consequence of an unorthodox maneuver of the aircraft. In order to create the loads acting mostly upward, the aircraft either has to be in a pitch up attitude where the dynamic pressure causes the fracture at 535, or else the aircraft would have to be accelerated in a pitch down maneuver. The rotational acceleration in pitch down would have to be of such a high unrealistic figure that it is out of the question. Hence, this fuselage fracture is secondary and is not a primary cause factor. For academic reasons, parts of the longerons and skin will be removed and subjected to hardness, pull, and metallurgical examination to determine whether or not they meet specifications. The report of these tests will be an appendix to this group report.

Since the survivor, from the front cockpit stated he did not release the canopy and it is doubtful whether the deceased pilot from the rear cockpit executed the canopy release, a study was made as to how they were released. The four hooks for the forward canopy on the upper fuselage rails were found unfastened and had rotated to the forward and unlocked position. The two hooks on the right side of rear cockpit were in partially locked position, those on the left side were unlocked. Since this part of the aircraft landed inverted, the impact and pressure with the ground could have moved the right-hand hooks to the partially closed position. The mating rollers on the canopy are unmarked. The writer observed a sharp mark made by the canopy release wire on the end of a tube through which the wire runs for the external jettison of the canopies. The direction of the markings is approximately in the 4:30 o'clock position. A reasonable explanation as to how the canopies were released is as follows. The outer chine section from the station 240 to the station 535 is an air-tight

compartment. However, when the forward part of the fuselage broke off due to upward forces it rotated so that the open end at 535 is now exposed to ram pressure. Lockheed engineering calculated that in approximately 0.13 seconds that 3 psi can be built up which is sufficient to blow out the silicone asbestos honeycomb which serves as the structural cover for the chine. The handle for external jettisoning of the canopies is located on the left upper chine cover at approximately station 320. When the chine blew out, it pulled the handle with it and the flexible cable, which mechanically released the canopies. When this occurred the forward part of the fuselage is approximately upside down, so that the explosive decompression and downward "g's", due to rotation, could break the pilot's seat belt which had broken. Estimating the weight of the pilot and equipment as 300 lbs and the strength of the seat belt as 3000 lbs, it would take 10 "g's" to break the seat belt. The "g's" due to rotation, plus the pilot's initial 1"g" upside down, aided by the outward push from explosive decompression could very likely be more than 10. Assuming a seat belt width of 5 inches and a length across his body and hips of 20 inches, the bearing of the belt on his body is 100 sq. in. The pounds pressure per sq. in. is then 30. This is diminished by the 4 lbs per sq. in. of his pressure suit. Considering the padding of his clothes, it appears that the above is an explanation of why there were no bruises on his stomach and hips.

The rest of the fuselage, wings and engines came down as a unit right side up. Upon impact with the ground the right nacelle separated and moved and rotated outward from the rear. No evidence of in-flight fire was apparent although there was ground fire. The ground fire severely burned the right fin.

Since, from the pilot's testimony, there was no response to his corrective control action first in roll and then in pitch up, and also from the direction of forces on the forward part of the fuselage which caused structural breakup, it is apparent that the cause of the accident is in the area of longitudinal instability. This adverse characteristic can be the result of one or more of the following, besides others:

1. Aero-Elasticity of the structure.
2. Inadequate control surface area.
3. Inadequate rate of control response.
4. Operating at too far rearward center-of-gravity.

The above items are now being investigated and will be presented in a separate report.

FINDINGS:

1. The structural breakup at fuselage station 535 is a result of exceeding structrual design limits due to aircraft longitudinal instability in pitch-up and is a secondary failure.

RECOMMENDATIONS:

1. It is recommended that various studies to delineate the cause for instability be made and adequate action be taken to prevent future accidents from this cause.

25X1A

[redacted]

Technical Advisor
Directorate of Aerospace Safety
Office of the Inspector General
Norton AFB, California

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MATERIAL GROUP REPORT
SR-71 S/N 61-7952 (2003)
Accident - 25 January 1966

1. The Material Factors Group Report consists of the Propulsion and Fuel, Electric and Electronics, Flight Controls, and Maintenance and Records Group Reports. Findings and Recommendations are summarized as follows:

FINDINGS:

1. The Flight Control System did not malfunction nor did it contribute to this accident.

2. The engines were operating in mid-afterburner range at the time of the accident and did not contribute to the accident; however, pilot distraction, caused by manual operation of the right forward inlet doors and subsequent unstart, could have contributed to the loss of control.

3. The right inlet unstarted from an undetermined cause.

4. The aircraft fuel system was not programming as desired during the first phase of the flight, subsequent to aerial refueling, it appears that it was programming in accordance with the pre-set schedule.

5. The C.G. was aft of the limiting C.G. at the time of the accident.

6. Maintenance factors and non-compliance with Service Bulletins did not contribute to this accident.

7. AC and DC power was available up to the time the aircraft disintegrated.

8. There was no evidence to indicate the loss of either AC generator or T-R unit.

9. The electronic, instrument and navigation systems operated satisfactorily during the flight.

10. The electric/electronic/instrument systems did not contribute to the cause of this accident.

RECOMMENDATIONS:

1. Fuel system scheduling be revised to maintain aircraft C.G. limits during Mach 3 plus flight.

2. C.G. indicator be provided in both cockpits.

3. The Project Support Office and the Engine Manufacturer conduct a study to provide more accurate configuration control of all engines.

4. Automatic inlet control reliability be improved.

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5. LAC review their aircraft records on DD Form2 829 and 829-1, reference Spike Assembly, to insure that the data recorded is correct and current.

RAY C GORDON, JR
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Directorate of Aerospace Safety
Norton AFB, California

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Propulsion Group Report

Propulsion Grpup Report on SR-71 Aircraft
S/N 61-7952 (2003) Major Accident Which Occurred
On January 25, 1966

JT11D20A engines S/N 648336 and S/N 648333 were installed in the left and right positions, respectively, on 17 November 1965. Neither engine had been removed from the aircraft for any reason since the original installation.

Engine historical data is as follows:

	Left Engine	Right Engine
Serial Number	P648336	P648333
Total Time	43:49 Hrs	62:19 Hrs
Military Time	22:54	30:07
Mach 3.+ Time	11:08	13:06
Mach 3.2+ Time	10:22	11:23

The above engine data does not include the January 25, 1966 flight time.

Pilot write-ups of engine discrepancies since the November 17, 1965 installation (flights 31 through 40) were reviewed. No discrepancies were noted which could have contributed to the accident.

The engines remained in their nacelles and with the main fuselage to the point of impact. Impact damage on the engines showed the impact was vertical with the aircraft in a relatively level attitude with no forward velocity. This resulted in crushing of engine cases and compressor and turbine blade damage which showed the engines were not rotating at the time of impact.

Examination of the engines revealed both engines received extensive foreign object damage (FOD). The damage was more severe on the right engine and caused compresor and turbine blade fractures. This resulted in turbine and compressor case rupture and penetration of nacelle surfaces by blade fragments.

Engine combustion cases and burner cans were removed. Debris recovered in this section revealed numerous pieces which were foreign to the engine but positive identification of the pieces could not be made. The battering of burner can domes and penetration of the inner cones by foreign objects is evidence that the engines were operating at high power at the time of object ingestion.

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Engine instrument readings obtained from the cockpit instruments which were captured at the time of loss of electrical power (separation of the fuselage) were as follows:

	Left Engine	Right Engine
CIT	372°C	365°C
CIP	Broken	9 psi
EGT	808°C	838°C
Fuel Flow	10,900 lbs/hr	11,300 lbs/hr
ENP	4.8	10.5

With the exception of the exhaust nozzle position (ENP) on the left engine, these readings correlate with engine operating conditions expected for the flight conditions at the time of the accident. The low exhaust nozzle area on the left engine (ENP 4.8) indicates the left afterburner had blown out prior to loss of electrical power.

The main fuel control and afterburner throttle settings were observed to be as follows:

	Left Engine	Right Engine
Main Fuel Control	Cut off	Minimum A/B range
A/B Fuel Control	Cut off	Minimum A/B range

These settings compare favorably with the reported cockpit throttle positions.

Engine internal bleeds, external bleeds and exhaust nozzle positions were observed to be as follows:

	Left Engine	Right Engine
Internal Bleeds	Open	Open
External Bleeds	Intermediate	Intermediate
Exhaust Nozzle	Closed	Closed

The exhaust nozzle and external bleed positions are not consistent with an engine experiencing a normal run down. Since the hydraulic fluid used in these systems is fuel, it is probable that the loss of fuel to the engines prevented the engines from functioning during engine run down.

Fuel System

The fuselage separation occurred at station 535, resulting in separation of the number 1 fuel tank. Other than this damage, the fuel sells remained substantially intact. Damage occurring at impact resulted in crushing of the bottoms of the tanks. The vertical trajectory of the aircraft in a level attitude is attested to by the vertical penetration of the top of number 2 and number 5 fuel tanks by their fuel probes.

The top surfaces of the number 6 fuel tanks (both left and right wing roots) were bulged upward as a result of internal pressures. These pressures were generated by explosions within the tanks subsequent to impact and as a result of the ground fire.

Post-impact fire resulted in melting of furl system components to the extent that fuel feed configuration and functional integrity of the system at the time of the accident could not be established.

Fuel readings during the first phase of the flight (prior to aerial refueling) as reported by the pilot and recorded on the "dictet" were compared to readings expected from a normally functioning fuel system. Results of this comparison indicate the fuel system was functioning normally up to and including aerial refueling.

Using the fuel tank quantities reported by the pilot (dictet), and assuming a normally functioning fuel system without the use of crossfeed, it was determined that a C.G. of 27% MAC existed at the time of the right engine unstart.

Aft C.G. limits for Mach 3.+ flight is reported to be 26.5% MAC. Fuel system scheduling, as presently configured, is capable of producing a C.G. which is marginal on aft limits. Corrective action is available to the pilot in that fuel can be transferred forward to the number one tank. The only means available to the pilot for determination of an out-of-C.G. condition is by computation.

Inlet System

The pilot reported that, while in a right turn with 30° of bank an unstart occurred on the right inlet. This was confirmed by the pilot's observation of compressor inlet pressures which showed the left inlet at 14 psi and the right inlet at 4 psi. The pilot was not sure that he had initiated the restart switches prior to leaving the aircraft; however, the restart switch for the right inlet was found in the restart psoition and the compressor inlet pressure for the right engine was found at 9 psi. These two findings, along with engine readings showing an exhaust gas temperature of 838°C, a fuel flow of 11,300, and an exhaust nozzle position of 10.5, indicate that the right inlet was restarting at the time of aircraft breakup.

During the establishment of cruise speed, prior to the turn, the pilot reported (dictet recording) that the right inlet forward bypass door had opened requiring selection of the manual control to close the door. Just prior to entering the turn, he manually opened the door slightly to provide some margin for prevention of an unstart. When the forward door is ON, automatic normally opens to a scheduled position, depending on the angle-of-attack and degree of yaw. Whether the pilot

opened the door sufficiently could not be determined. Further, it cannot be determined,if the automatic door system had been functioning normally, whether the unstart would have occurred.

The right nacelle was subjected to intense post-crash fire resulting in damage to the inlet control wiring. Wiring deficiencies have been a large contributor to inlet control deficiencies and necessitated changes which are provided by Service Bulletin 212. This bulletin was not complied with on the right nacelle.

FINDINGS:

1. The engines were operating in mid-afterburner range at the time of the accident and did not contribute to the accident.

2. The right inlet unstarted from an undetermined cause.

3. The aircraft fuel system was operating satisfactorily during the first phase of the flight and through aerial refueling.

4. Assuming the fuel system operated normally after aerial refueling, the C.G. was approximately 27% at the time of the accident.

RECOMMENDATIONS:

1. Fuel system scheduling be revised to maintain aircraft C.G. limits during Mach 3.+ flight.

2. C.G. indicator be provided in the front cockpit.

Ray Gordon Jr Lt Col USAF

For ARTHUR G SMITH
DIRECTORATE OF AEROSPACE SAFETY
NORTON AFB, CALIFORNIA

ELECTRICAL, ELECTRONIC AND INSTRUMENT SYSTEMS

ELECTRICAL SYSTEM

1. Separation of the forebody from the main structure at high altitude precluded the finding of rotational scrolling on electrically driven motors such as those of fuel booster pumps and cooling motors. The separation parted all AC generator feeders to the power center in the LH chine area just forward of the nose gear. The post-impact fire destroyed all except one of the fuel booster pump assemblies, thus precluding any evidence of pump rotation. The fuel booster pump that was in an unburned state was in the wreckage of the forebody and was most likely one of the pumps from the number 1 tank. It consisted of the motor, motor housing and the impeller. One blade of the impeller was bent against the flat portion of the drive end of the motor with no evidence of scrolling. In all probability, the blade bent as a result of ground impact since it is unlikely that this damage occurred as a result of forces imposed during the initial break-up of the airplane. The impeller housing of this pump most probably remained attached to the pump mounting in the main portion of the structure that burned.

2. The only rotational scrolling evidence found was thaton the end bell of the SR-3 system gyro. This resulted from the long-coast down time peculiar to gyros.

3. Nothing could be learned from the electrical power center components, such as generator breakers, generator control units, etc.. Although unburned, major impact damage destroyed all evidence.

4. There was typical evidence of arcing and welding of some strands of the generator feeder cables which would be expected at the time of airframe separation when the generators were feeding a load.

5. The pilot did not see any warning lights that would have indicated difficulty with the electrical, electronic, or instrument system, nor did he note any other phenomena that would indicate any difficulty with these systems.

6. The evidence of oeprational aspects contained elsewhere in this report and the statements of the pilot indicate that AC and DC power was available up to the time the airplane was committed to crash.

ELECTRONIC SYSTEM

1. All of the principle components of the electrical, electronic and instrument systems were recovered with crash damage only since they were contained in the forebody which was not involved in any possible in-flight fire and no post-crash fire. The forebody struct the terrain in a relatively flat attitude, inverted. Upon impact, the forebody broke into three major components: the forebody proper, the radome and the pitot/static boom. A considerable number of electronic components were released from the forebody during or closely following the initial separation of the forebody. These components were associated with the Inertial Navigation System (INS), the Electromagnetic Reconnaissance System (EMR) and the Mission Recording System (MRS).

2. The tape from the MRS was separated from the main component and was still missing at the time this report was written. The EMR tape was recovered from the EMR package which was found some distance from the forebody. Reduction of data from this tape shows chronological evidence that the system operated up to the time of the airframe separation. Details of the EMR tape data appear in the Flight Controls Group Report.

3. The Dictet Recorder was recovered from its normal position in the forward cockpit. The recorded conversation showed the availability of electrical power up to the time the last known dictation was performed by the pilot. The transcription of this recording is in Tab V of the Report.

4. The INS package was sent to Nortronics for data reduction on 3 February since the means for extracting memory data therefrom do not exist locally.

5. The Stability Augmentation System (SAS) pitch and yaw rate gyros were severely burned, having remained in their normal position and subjected to the post-impact fire at the main scene. An acetylene torch was used to remove the structure to which the gyros were attached with the connectors intact and engaged. A subsequent examination showed that the connectors were properly mated. Internal impact and fire damage precluded a functional test since there were open and shorted circuits in evidence when a pin-to-pin continuity test was made.

6. The fall-out pattern of components was generally in a semi-circle to the south of the forebody. Winds aloft for Tucumcari during the period in which the accident occurred averaged 310° with velocities ranging from 14 knots at 7,000 feet up to 49 knots at 25,000 feet. Data was not available for winds above 25,000 feet at Tucumcari.

7. Considerable effort was expended to determine proper connections and safetying devices to all electrical, electronic and instrument components. The only discrepancy found was a demated connector (J104) to the pilot's interphone control box. It is highly probable that an unknown person disconnected this plug or that it became loose and fell away during salvage operations or during the transport of the forebody by truck from the scene to Edwards AFB. The other connector to the interphone control box was secure. These connectors are not normally safetied. There was no evidence to indicate any difficulty in communication between the pilot and the RSO or air-ground communication.

8. There was no evidence to indicate that the electronic/navigation systems failed in any way.

INSTRUMENT SYSTEM

1. The elevation at the main impact scene was 4680 feet, as measured by a serviceable altimeter, with a setting obtained from the FAA Flight Service at Tucumcari. The elevation at the impact point of the forebody was approximately 150 feet lower (not measured).

2. Instrument readings and pertinent control settings in the front cockpit were as follows:

SECRET
SPECIAL HANDLING REQUIRED

a. Accelerometer - minus 2.6g, plus 8g (not reliable, pointers free to move).

b. Triple Display Indicator (TDI) - KEAS: 036
- Alt: 76,450
- Mn: 037

c. Airspeed Indicator - 65K

d. Attitude Direction Indicator (ADI) - Inverted Dive, Heading 130°.

e. Elapsed Time Indicator (ETI) - 1:36 hours. The indicator was started at 11:20 hours PST by the pilot at take-off roll. This elapsed time does not coincide with known facts.

f. Altimeter - 5,160 feet, setting 30.24

g. Angle-of-Attack Indicator - 15.5° nose up

h. EGT - LH: 808°
RH: 838°

i. Nozzle Position Indicators - LH: 4.8 units
RH: 10.5 units (0.5 off scale)

j. Fuel Flow Indicators - LH: 10,900 (lbs/hr)
RH: 11,300 (lbs/hr)

k. TEB Counters - LH: 4
RH: 4

l. Throttle positions - LH: Undetermined
RH: Mid-A/B range

m. Engine Trim Switches - Both neutral (LH broken)

n. FBPD Switches - Missing

o. ABPD Switches - Broken

p. Spike Switches - Both in Auto (LH Emergency Switch in EMERG)

q. Compressor Inlet Temperature Indicators (CIT) - LH: 373°
RH: 365°

r. Compressor Inlet Pressure Indicators (CIP) - LH: Broken
RH: 9 (psi)

s. Restart Switches - LH: Missing
RH: RESTART

t. Fuel Shutoff Switches - Both in VALVE OPEN position.

u. Fuel Quantity Indicator - 38,100 lbs. (Fuel qualtity selector switch position : TOTAL.)

SECRET
SPECIAL HANDLING REQUIRED

v. Hydraulic Pressure Gages - LH: 3150
RH: 3500
A: 3100 (psi)
B: 3250 (psi)

w. Canopy Handle - Unlocked position (aft) but not connected mechanically.

x. Standby Oxygen Selectors - Nr. 1: ON
Nr. 2: OFF

3. Instrument readings and pertinent control settings in the aft cockpit were as follows:

a. Triple Display Indicator (TDI) - KEAS: 1710K
Alt: 77,600 Feet
Mn: 2.15

b. Radio Magnetic Indicator (PMI) - Card: 131°
Nr. 1 pointer: 140°
Nr. 2 pointer: 317°

c. Standby Attitude Indicator (2-inch) - 15° nose up, 88° R bank

d. Liquid Oxygen Quantity Indicator - Nr. 1: 8.5 (liters)
Nr. 2: 8.0 (liters)

e. V/H Indicator, milliradians/second (MR/SEC) - A Pointer: 41.1
M Pointer: 38.7

4. Readings of instruments and control positions not mentioned herein is because of excessive damage, missing components or factors that have no significance.

FINDINGS

1. AC and DC power was available up to the time the airplane disintegrated.

2. There was no evidence to indicate the loss of either AC generator or T-R Unit.

3. The electronic, instrument and navigation systems operated satisfactorily during the flight.

4. The systems discussed herein did not contribute to the cause of the accident.

RECOMMENDATIONS

None

Ray Gordon Jr Lt Col USAF

FOR ROBERT D NAGLE
Directorate of Aerospace Safety
Norton AFB, California

SECRET

SPECIAL HANDLING REQUIRED

FLIGHT CONTROLS GROUP REPORT

SR-71 S/N 61-7952 (2003)

Major Accident - 25 January 1966

1. Inspection of the aircraft controls was conducted at the accident site and at Edwards AFB. On-site inspection included removal of servo panels, SAS pitch and yaw rate gyro packages and inspection of visible control hardware connections. The on-site inspection revealed no hardware malfunctions.

2. Inspection and investigation at Edwards AFB revealed the following:

a. Primary Mechanical Controls (Cables)

The center control console in the forward cockpit was extensively damaged at impact and no detailed examination was made of the internal components. The control stick was doubled back and part of the control grip missing. The emergency landing gear system cable was broken in tension at the handle socket. The emergency drag chute cable was still attached to the "T" handle and pulled from the handle socket approximately two feet. The largest amount of control cables were found in a bundle near the nose section but not attached. Many of these cables had been cut with a torch to help in transport and could not be identified as to function. All of the calbes in this bundle were either failed in tension due to overload or cut with a torch. The aft ends of all 12 primary control cables were still properly connected to their terminal quadrants and failures due to overload were found in each cable forward of this point. The evidence indicates that the primary cables were complete and in-place at the time of the accident.

b. Mixer

The torque tubes from the quadrants to the mixer were connected. The mixer had all of its attaching and pivot bolts in-place and safetied. The pitch trim actuator was in-place but damaged. The length of the actuator indicated that the aircraft was in a 2.8° nose up trim position prior to loss of electrical power. The roll trim actuator was badly damaged although both of its attachments were in-place and safetied. The roll trim was approximately at neutral prior to loss of electrical power. Both pitch and roll feel springs were damaged but in-place and connected. The mechanical linkage from the mixer to the inboard elevon servos was damaged. All connections at rod ends and bellcranks were in-place and accounted for.

c. Inboard Servo

Both inboard elevon servos were damaged but the damage appeared to be from impact and fire. The servo feedback rods and summing levers were attached and safetied. All electrical connections to the inboard servos were accounted for, although they were badly damaged. All of the inboard elevon actuators were connected properly.

SECRET

SPECIAL HANDLING REQUIRED

Approved For Release 2001/08/29 : CIA-RDP71B00590R000100100001-4

d. Primary Mechanical Controls (Elevon Inboard to Outboard Transmission)

The 4AC32g-1 spring-loaded push rod assembly (shotgun) in both the right-hand and left-hand inner wing was in the centered (detent) position. Every joint in the elevon push rod systems in the inner and outer wing and the torque tubes in the nacelles were found. All of the bolted connections were still in-place and safetied. All of the push rod breaks were matched and were either torch cuts or breaks produced by impact.

e. Outboard Servo

The left-hand outboard elevon servo and all of its components (servo, summing lever, feedback rod, actuators, and attachments) were in good condition and in-place. The right-hand outboard elevon servo and its components were badly damaged. The right-hand outboard wing rear beam (cylinder support) was fractured and some of the cylinders were damaged. The right-hand outboard elevon servo was damaged. The damage to the right-hand outboard elevon servo and its components was due to impact and fire.

f. Rudder Push Rod System

All of the connections for the rudder push rod systems from the terminal pulley through the nacelle to the rudder servos were found to be in-place and properly connected to their cranks. The fore and aft push rod in the left-hand fin was broken at impact. Both push rods in the right-hand nacelle and the torque tube in the left-hand nacelle had been torch cut for transport.

g. Rudder Servo

The left-hand rudder servo was torn loose from its mounts in a downward direction. The shear pin, attaching the trim actuator hanger to its support structure, had been sheared. The summing lever and feedback rod were in-place and safetied. All actuators were in-place and properly pinned. All electrical connections were connected and safetied. The damage noted was caused by impact. The right-hand rudder servo and all of its components (servo, summing lever, feedback rod, electrical connections, and actuators) were in-place and safetied.

3. The following data were recorded on the Electromagnetic Reconnaissance System as output from the Astroinertial Navigation System.

a. Inclosure number 1 is the EMR data in graph form. Page 5 is approximately the last 30 seconds recorded. Altitude change was from 77.5K to 79.2K, navigation system pitch change was from 6.9° to 13.2°, roll change indicated slight left wing down 9.6° just prior to start of turn, this progressed to right wing down 41.5°, true heading change was from 93.6° to 107.9°, and change in flight path data presented represents the deviation from the straight line path at the beginning of the turn.

b. Inclosure number 2 represents the rate change over the same period of time for pitch, roll and heading. Maximum recorded rates for heading was 3.7°/sec, for pitch 1.3°/sec and for roll 5.4°/sec.

4. Analysis of the above data and data obtained in the SR-71 flight simulator located at Beale AFB, and the engineering flight test simulator at Edwards AFB is contained in the Flight Simulator Study of the Operations Witness Group Report.

FINDINGS:

1. That the Flight Control System did not contribute to this accident.

RECOMMENDATIONS:

1. None.

RAY C GORDON, JR
LT COL, USAF
DIRECTORATE OF AEROSPACE SAFETY
NORTON AFB, CALIFORNIA

FRL - FUSELAGE REFERENCE LINE - AXIS OF CYLINDAR FORMED BY FORWARD FUSELAGE.

ROLL - ANGLE ABOUT FRL. ZERO ROLL OCCURS WHEN WINGS ARE LEVEL AND FRL IS HORIZONTAL. ROLL IS NOT AFFECTED BY PITCH OR YAW

PITCH - ANGLE BETWEEN FRL AND HORIZONTAL PLANE. PITCH WILL REFLECT A COMPONENT OF YAW IF VEHICLE IS ROLLED

HEADING - ANGLE BETWEEN FRL AND TRUE NORTH, MEASURED IN HORIZONTAL PLANE. HEADING WILL INCLUDE A COMPONENT OF ANGLE OF ATTACK IF VEHICLE IS ROLLED.

YAW - ANGLE BETWEEN FRL AND VELOCITY VECTOR, MEASURED IN WING PLANE.

ANGLE OF ATTACK - ANGLE BETWEEN FRL OR WING REF LINE AND VELOCITY VECTOR, MEASURED IN PLANE PERPENDICULAR TO WING PLANE AND INCLUDING FRL.

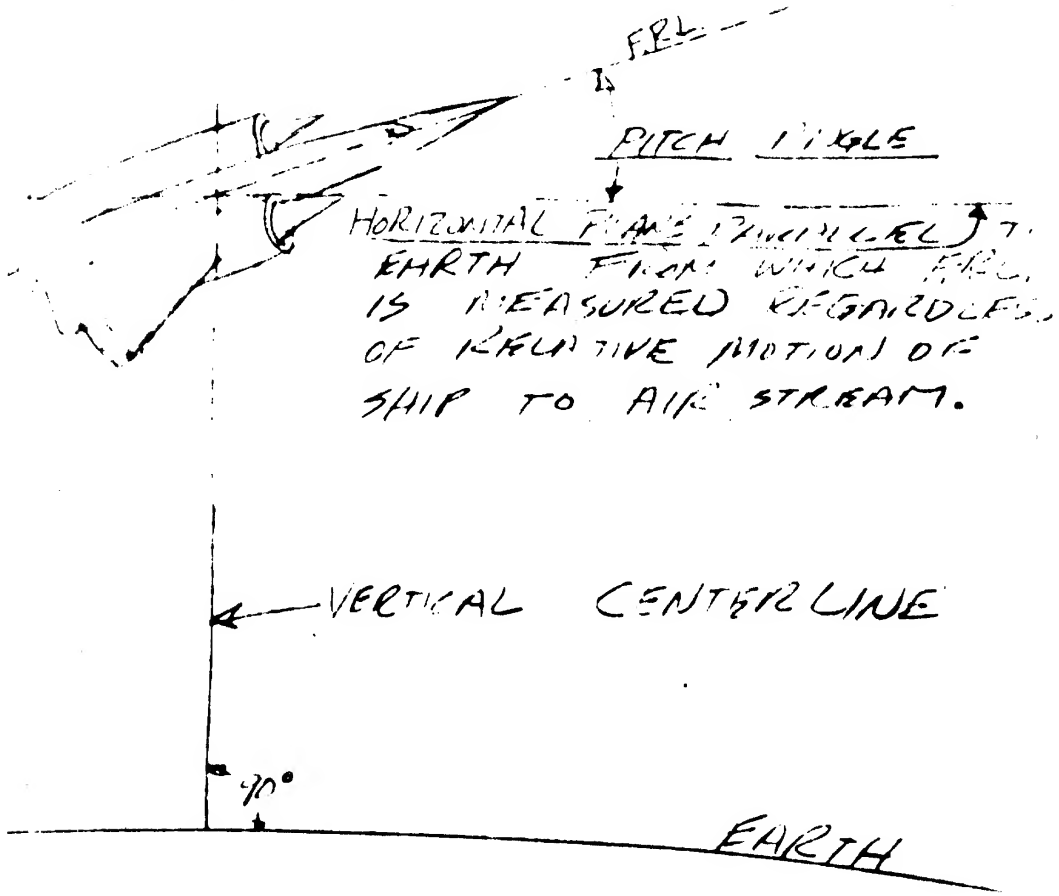
THESE WORDS SHOULD BE UNDERSTOOD BEFORE USING THE PLOTTED DATA OF 2003's NAV/RMR FLITE TAPE.

D.

(1)

Incl #1

SECRET
SPECIAL HANDLING REQUIRED



SECRET
SPECIAL HANDLING REQUIRED

(2)

STATOTHR

PREPARED BY [redacted]
DATE 2-1-66
CHECKED BY

LOCKHEED-CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

PAGE
MODEL
REPORT NO

2003 FLT 41 - FIRST TURN

BAROMETRIC ALTITUDE

SECRET
SPECIAL HANDLING REQUIRED

PITCH

ROLL

RIGHT WING DOWN

335.2° TRUE HEADING 340°

342.4°

CHANGE IN FLIGHT PATH

0.0

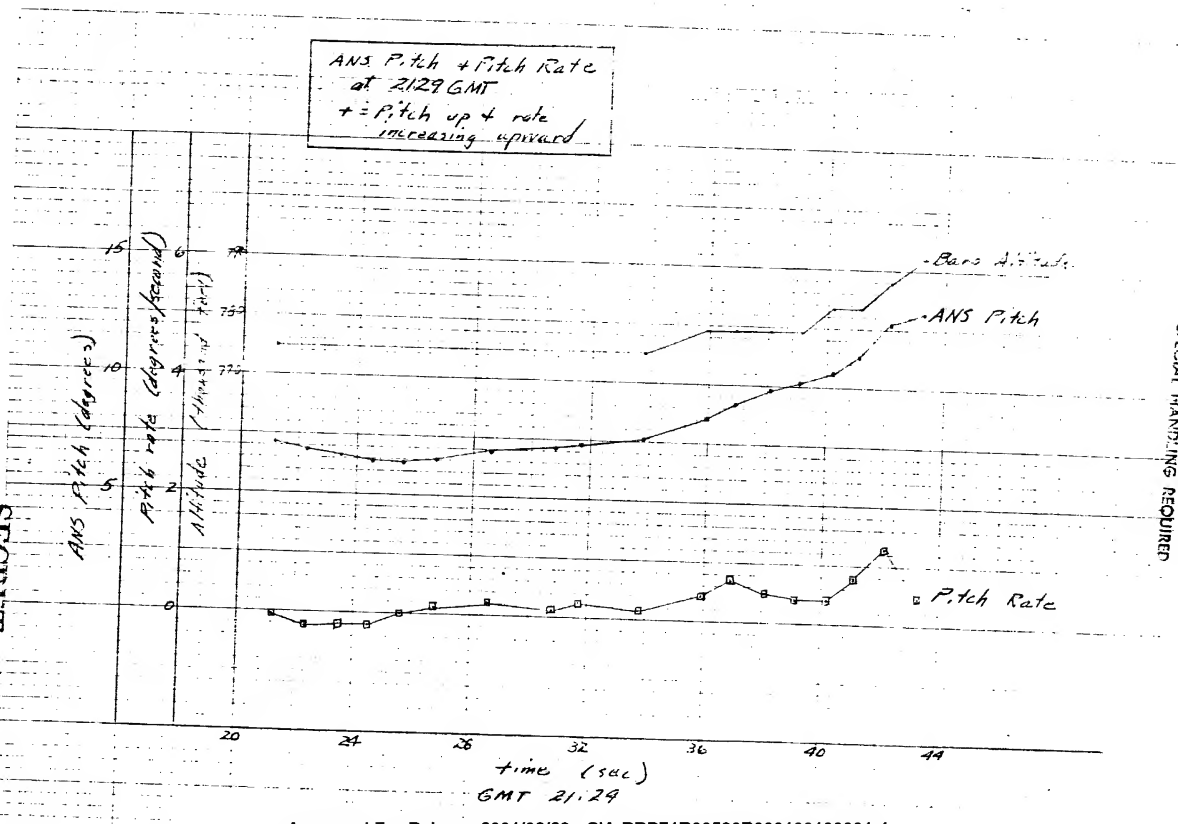
0.62 NM

19:42:35 40 45 50 55 19:44

GMT, 2 SEC PER DIVISION

(3)

SECRET
SPECIAL HANDLING REQUIRED



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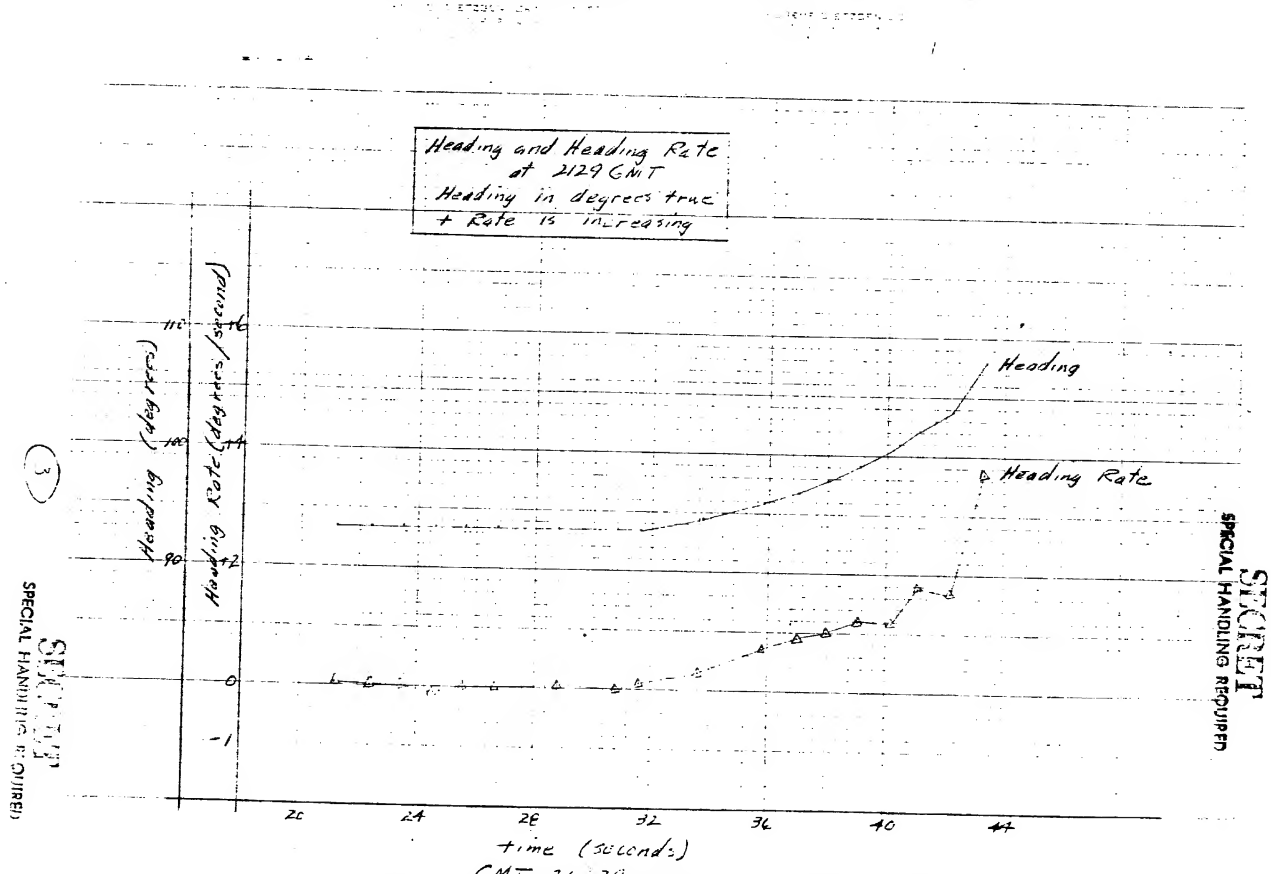
SECRET
SPECIAL HANDLING REQUIRED

(1)

#2



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PREPARED BY [redacted]
DATE 2-1-66
CHECKED BY

LOCKHEED-CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

PAGE
MODEL
REPORT NO

2003 FLT 41 -SOUTH TURN GRD SPEED 1830 K 491

82.7 K BAROMETRIC ALTITUDE

SECRET
SPECIAL HANDLING REQUIRED

81.8 K

6.7° PITCH 6.5°

5.9°

0.9° ROLL

LEFT WING DOWN

52.7°

160.4° TRUE HEADING

198.9°

CHANGE IN FLIGHT PATH

0.0 NM

0.28 NM

4

SECRET
SPECIAL HANDLING REQUIRED

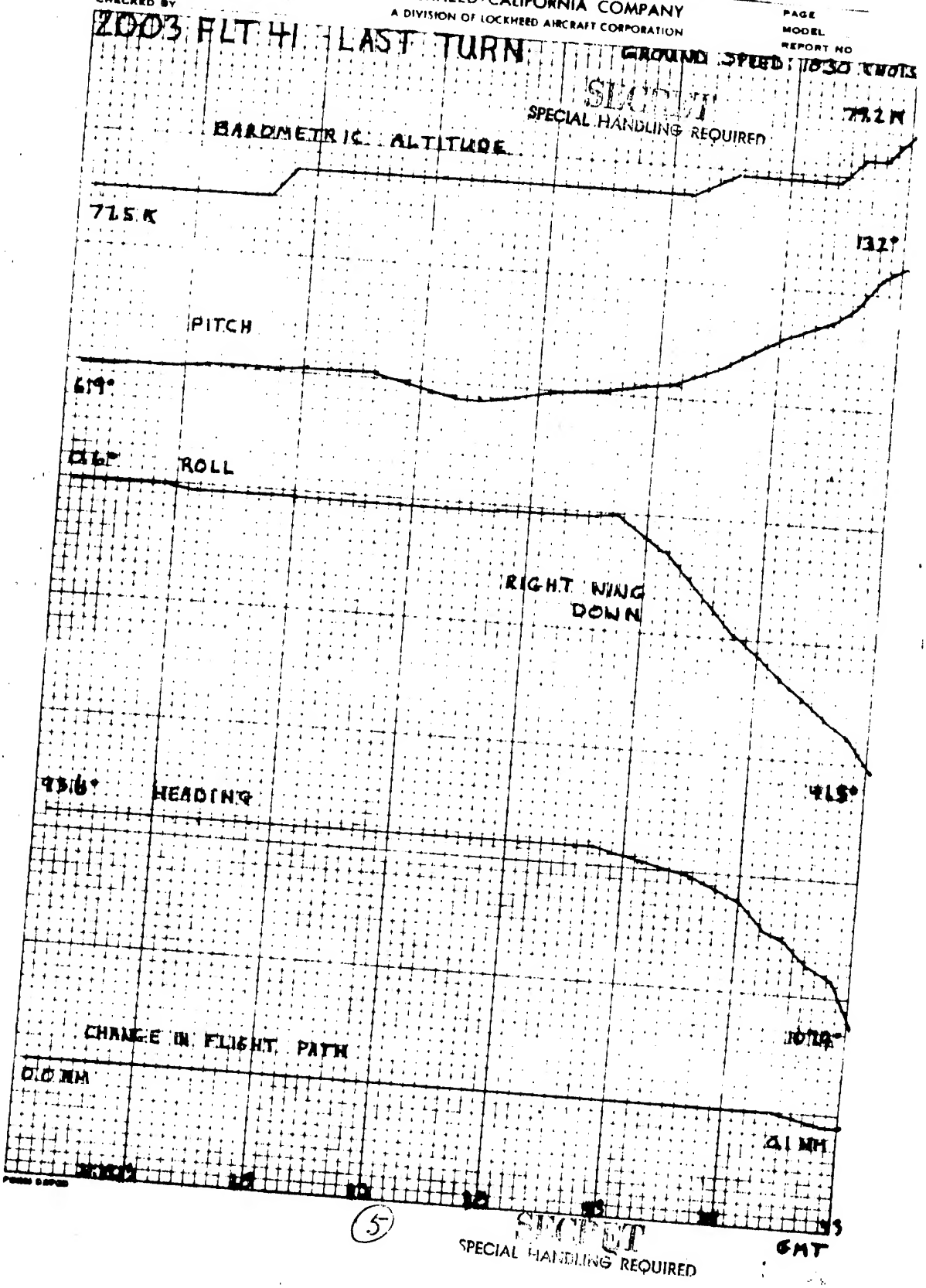
GMT

STATOTHR

PREPARED BY [redacted]
DATE 2-1-66
CHECKED BY

LOCKHEED CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

PAGE
MODEL
REPORT NO



STATOTHR

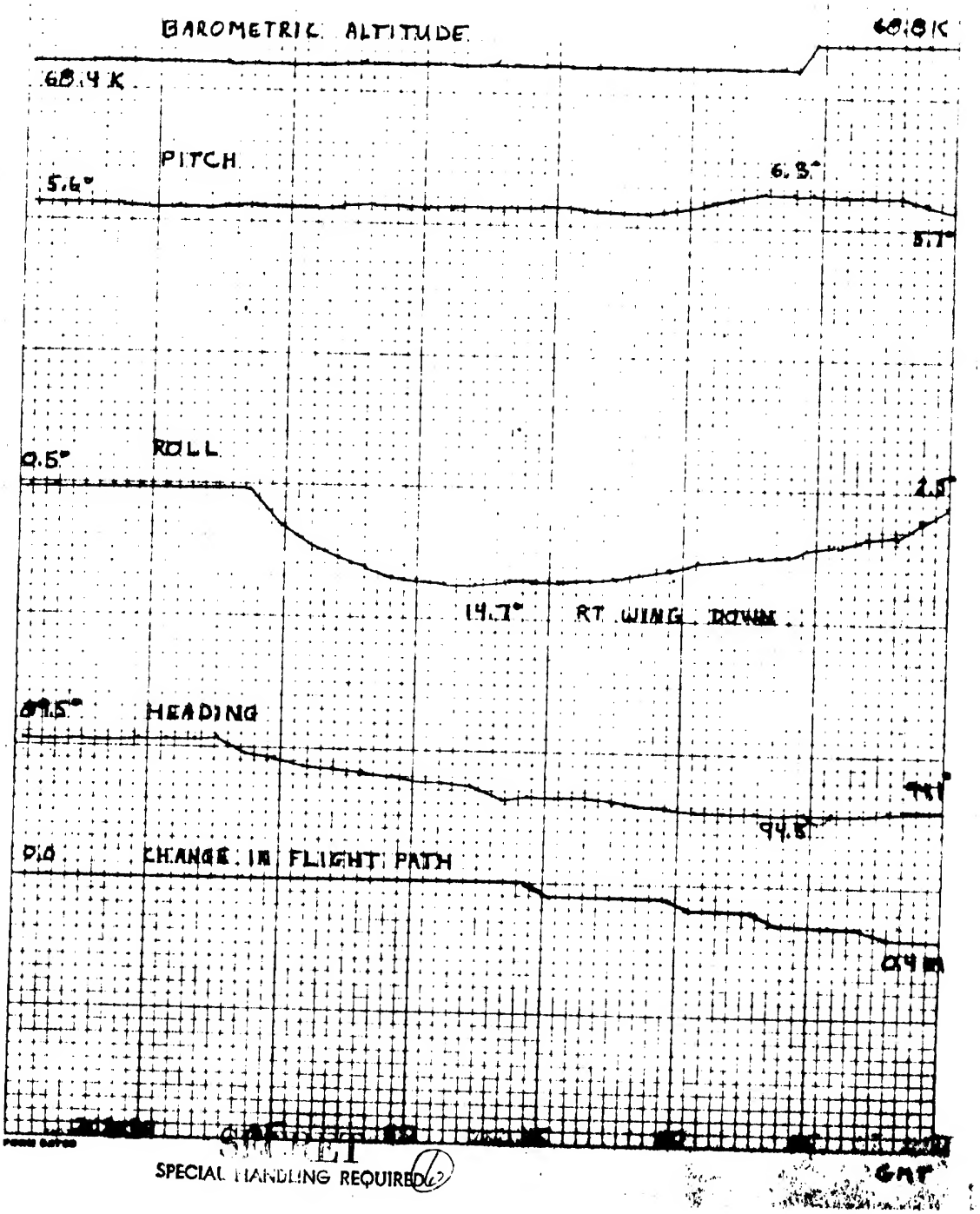
PREPARED BY [redacted]
DATE 2-1-66
CHECKED BY

LOCKHEED-CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

SPECIAL HANDLING REQUIRED

2003 FLT 41 - EAST LEG GRD SPEED 1169 TO 1220 KNOTS

RH FWD BYPASS DOOR MALFUNCTION (1 OF 2)



SECRET

SPECIAL HANDLING REQUIRED

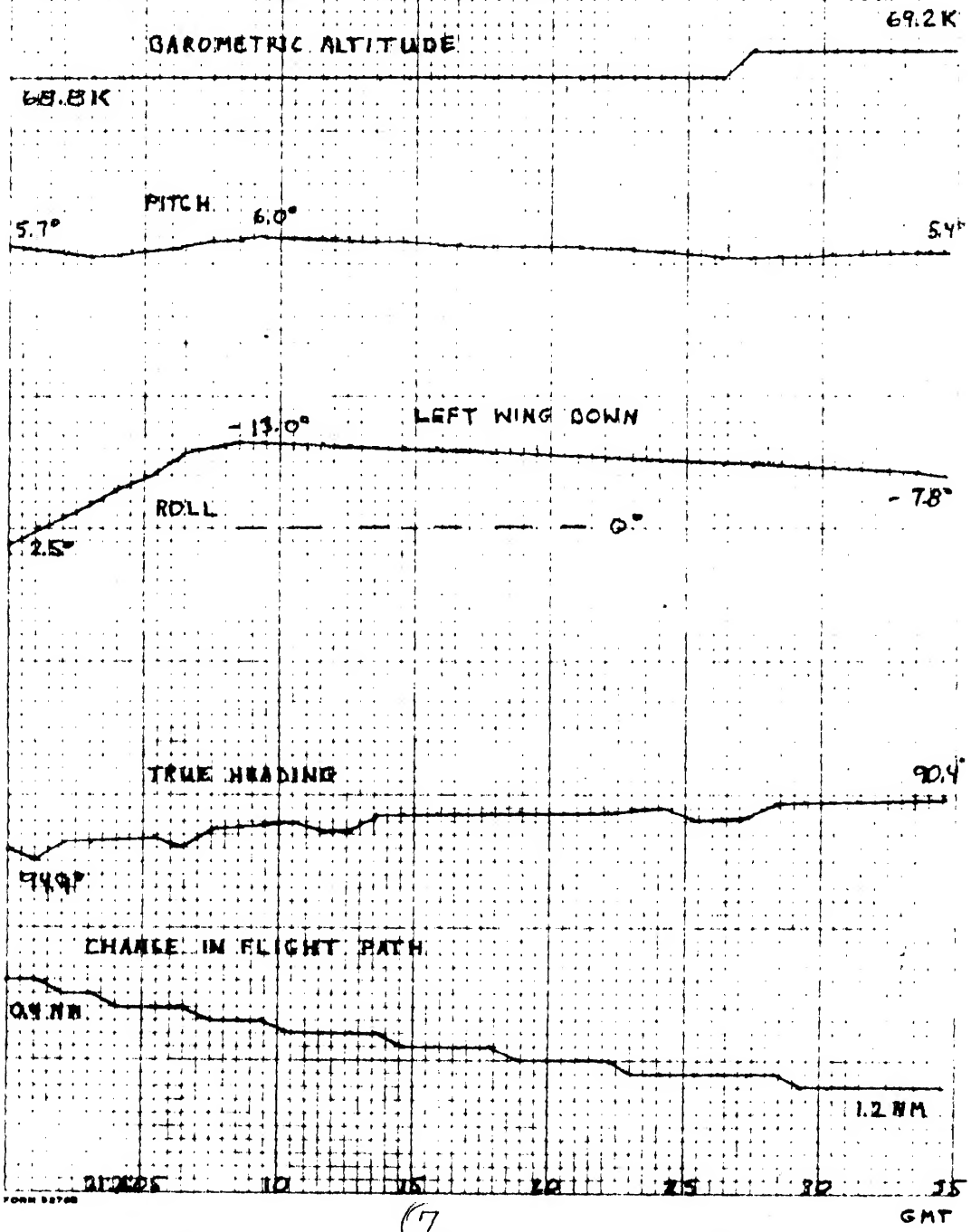
STATOTHR

PREPARED BY [redacted]
DATE 2-1-66
CHECKED BY

LOCKHEED-CALIFORNIA COMPANY
A DIVISION OF LOCKHEED AIRCRAFT CORPORATION

PAGE
MODEL
REPORT NO

2003 FLT 41 EAST LEG GRD SPEED 1676 TO 1687 KNOTS
RH FWD BYPASS DOOR MALFUNCTION (2 OF 2)



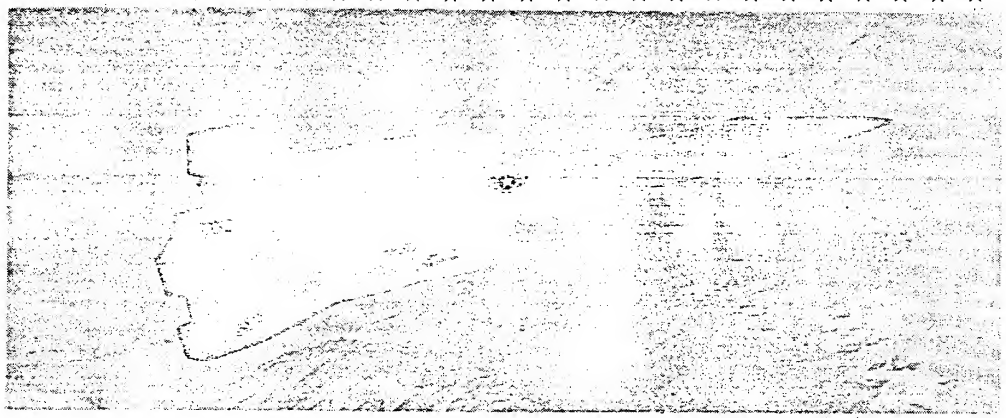
1 DEAD, 1 SURVIVOR

AMARILLO DAILY NEWS, Amarillo, Texas, 26 Jan 1966

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Spy Plane Down In NM

★ ★



—U.S. Air Force Official Photo

Spins Out in Flight

This is an aerial view of the SR71 which crashed in northeastern New Mexico Tuesday afternoon. Performance of the plane, which carries a crew of two, is termed the most effective of any operational aircraft in the world. One of the crew members was killed, but the other was not seriously injured in a bailout from 80,000 feet.

Security Lid Put on Crash

By DON REYNOLDS and WES PENDLEY
Of Our Staff
and BOBBIE LUTZ
Our Eastern New Mexico Correspondent

MOSQUERO, N.M.—One civilian test pilot was killed and another injured about 4:15 p.m. Tuesday when a top secret SR71 super spy plane apparently caught fire in midair and pancaked onto a high plateau in Harding County, New Mexico.

The twin-engine, 2,000 mile-per-hour aircraft was found virtually intact a quarter-mile east of New Mexico 102 and a mile north of New Mexico 65, about 20 miles east of here.

Air Force officials at Edwards Air Force Base, Calif., identified the dead man as James T. Zawyer of Lancaster, Calif.

The injured man, who was not believed to be in serious condition at Trigg Memorial Hospital in Tucumcari, N.M., late Tuesday, was identified as Bill Weaver, 37, resident of Northridge, Calif.

Air Force and civilian security and investigative personnel from Amarillo Air Force Base, Wright Patterson in Ohio and two California bases were summoned to the accident scene and were still pouring into the area after midnight Tuesday.

Witnesses reported they heard a loud "popping" noise when the plane, flying at high speed and great altitude, apparently exploded.

After the first exploding noises were heard by witnesses on the ground, the aircraft's speed diminished greatly, and it began a slow, spiraling fall to the ground, trailing a stream of heavy white smoke as it descended.

Albert Mitchell Jr., an eyewitness to the crash, reported he and several ranch hands were branding colts at his ranch headquarters east of Mosquero.

Mitchell said, "At first, we heard a loud bang, then we saw smoke, and about four minutes later we saw two parachutes."

The two-man crew is enclosed

Crash--

(Continued From Page 1)

in a pressurized capsule which protects the men should it become necessary to abandon the aircraft at high speeds and high altitudes.

Reportedly, the capsule automatically ejected when the plane was flying in excess of 80,000 feet. The plane is capable of speeds up to 2,000 miles per hour at that altitude.

"One of the fellows was dead when I got to him. I got to this Weaver boy about a minute after he landed. I helped him collapse his chute and get free of the harness," Mitchell said.

Mitchell, also a pilot, jumped in the ranch helicopter and flew to the landing place of the pilots. He picked Weaver up and took him to the Tucumcari hospital, but left the body of the dead man in place.

Air Force security officers isolated Weaver at the hospital and allowed only two doctors to treat him. Dr. Thomas B. Hoover and Dr. George Evetts were conducting various medical tests on the injured aviator late Tuesday.

An attendant at the hospital said Mitchell landed his helicopter on the hospital parking lot, but said she was under strict orders "not to give out any information" concerning Weaver.

She did say, however, that Weaver "walked in" to the hospital.

Mitchell said he talked to Weaver during the trip to the hospital. According to Mitchell, Weaver said, "Everything was going fine, and suddenly—whoof."

Mitchell said the aircraft was flying at an extremely high altitude when it exploded.

Weaver later told Air Force officials at the hospital that he was "pretty sore." Doctors, however, said there were very few visible injuries, notably a light cut on his nose.

The plane crashed on the Norman Libbey Ranch, about four miles from the landing place of the two flyers.

Quay County Deputy Sheriff Dub Smith said that a bulletin came over his police radio about 4:20 p.m. from the State Police headquarters.

State police ordered that the area be guarded with officers and that the body of the dead man was not to be moved until Air Force officials arrived at the scene.

Gil Henshaw, editor of the Tucumcari, N.M. Daily News, reported that he went to the scene and found the fuselage generally intact.

He said the entire plane was blackened by fire, and that some flames were still flickering in the area when he arrived. The only portion of the plane which appeared extensively damaged was the nose section.

Debris from the nose of the plane was strewn over a small area, and a deep gouge ran through the earth for only about 30 feet. The evidence prompted Air Force officials to assume that the plane had "pancaked" to the earth, falling flat on its belly rather than sliding along the ground.

It was assumed that radio contact of some kind had been made by the pilot before the two-man crew ejected.

Libbey said within moments after the plane disappeared from view, two Air Force jet fighters were circling the area.

Three employes at an ice plant near Mosquero also witnessed the descent of the plane. They told Harding County deputy sheriff Steve Vigil that they looked up after a sharp explosion and saw the plane circling and smoking directly above them.

They said the plane was flying in a northeasterly direction before the sound of the explosion. None of the three noticed parachutes.

Shortly after the plane hit the ground, state police had formed a cordon around it. Less than an hour after the crash, a rope barrier had been thrown up around the wreckage.

Hinshaw said a photographer who accompanied him to the crash site was allowed to take pictures, but that his film was confiscated by state police before they left the area.

Maj. Dennis O'Brien, public information officer at Amarillo Air Force Base, said the investigation of the crash was the responsibility of Cannon Air Force Base at Clovis, the closest military installation.

Cannon officials, however, requested personnel from Amarillo Air Force Base to assist in security precautions and investigation.

Maj. O'Brien said that Brig. Gen. C. D. Stewart, director of aerospace safety at Norton Air Force Base in San Bernardino, Calif., would be in charge of the investigation.

Under his command will be personnel from Amarillo, Cannon, Norton and Wright-Patterson Air Force Base in Ohio.

An 11-man squad headed by Flying Safety officer Maj. James Hahn from the Amarillo base was sent to the crash scene Tuesday afternoon. Included were air policemen and safety personnel.

Washington military officials Tuesday afternoon issued directives to two Tucumcari funeral homes and to Roy Rumbaugh, administrator of Trigg Memorial Hospital, ordering them not to release any type of information about the dead aviator.

Disposition of Zwayer's body was not certain late Tuesday, but reports indicated that it would be taken to Cannon Air Force base in an Air Force ambulance.

The SR71 is a later development of the YF12A, which was formerly designated the A-11.

All three aircraft were developed by the Lockheed Aircraft Corp., employers of the two civilian test pilots.

The New Mexico accident was the first reported in the entire testing sequence of all three planes.

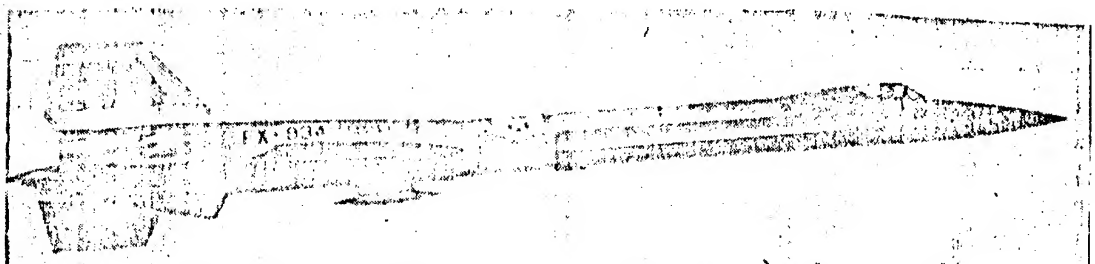
The YF12A recently was put into military service as an operational weapon system at Beale Air Force Base, Calif.

Testing on the newer SR71, however, is continuing at Edwards Air Force Base.

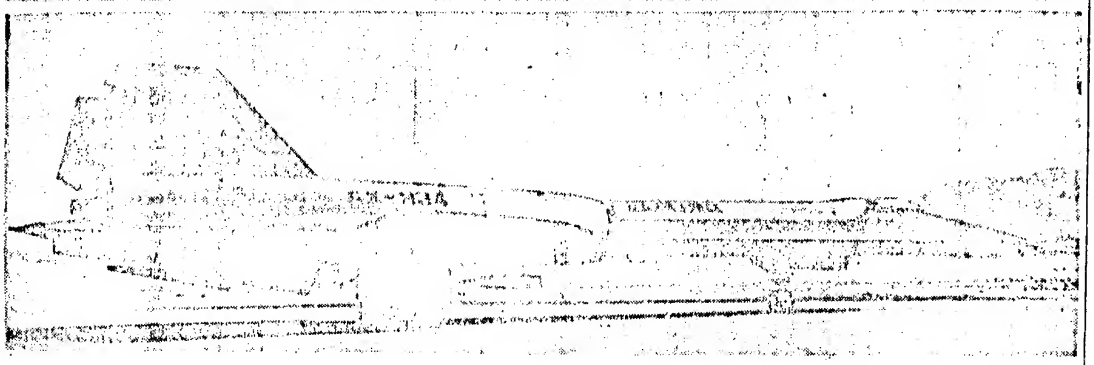
The YF12A was designed to carry missiles to shoot down high-flying bombers. The SR71 carries some armament, primarily a sophisticated air-to-air missile, but is designed primarily as a successor to the much slower U2 reconnaissance aircraft.

Observers at the crash scene late Tuesday were warned to stay clear of the aircraft until any armament aboard could be located and deactivated.

B



THE DALLAS TIMES HERALD, Dallas, Texas, 26 Jan 1966



—AP Wirephoto

These are aerial and ground views of super-secret U.S. spy plane.

Secrecy Cloaks Jet Crash

Test Pilot Killed in Mystery Mishap

ROY, N.M. (AP) — The military clamped a tight security cover around a northeast New Mexico ranching area after the flaming crash of a 2,000-mile per hour American reconnaissance plane.

One test pilot was killed and another injured slightly [illegible] the black SR71 spiraled to earth near the Texas border [illegible] Both men parachuted out [illegible] burning jet. One was found dead by ranch workers.

The Air Force stopped everyone but ranchers and their employes from entering the area, and refused to elaborate on details of the crash.

A spokesman at Edwards Air Force Base, Calif., said the SR71 was on a routine long-range test flight. The spokesman said that it was the first reported accident for the new series of twin-engine surveillance craft capable of scanning 60,000 square miles of earth from an altitude of 80,000 feet.

The Lockheed Aircraft Corp., which builds the secret craft, identified the dead pilot as James T. Zwayer of Lancaster, Calif. The injured man, Bill Weaver, 37, of Northridge, Calif., was admitted to a Tucumcari hospital but he was not believed seriously hurt.

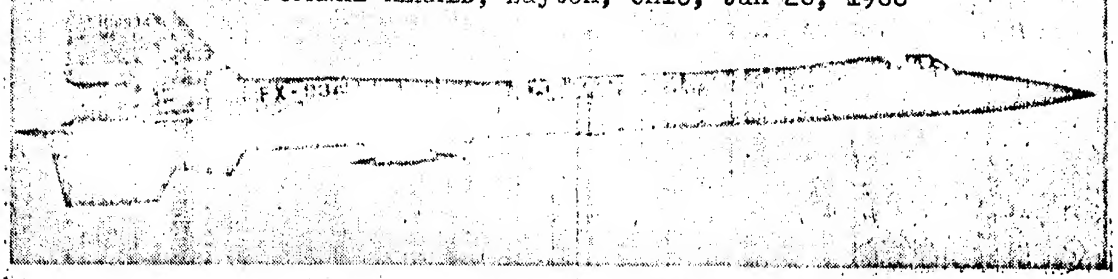
A rancher who carried Weaver by helicopter to the hospital quoted him as saying he didn't know what happened to the plane.

"Everything was going fine and suddenly — whoof," Albert Mitchell Jr. quoted Weaver as saying.

Mitchell and several others said they heard explosions before the plane began a long fall to earth, trailing smoke.

The SR71, a slightly heavier and longer model of the YF12A built by Lockheed, went into service Jan. 7.

JOURNAL HERALD, Dayton, Ohio, Jan 26, 1966



Associated Press Wirephoto

Super Spy Plane Shown in Flight

. . . SR-71 flies at 2,000 miles-an-hour

SR-71 Crashes During Test, Killing One Pilot

ALBERT, N.M. — (UPI) —A new Air Force jet reconnaissance plane capable of flying more than 2,000 miles-an-hour exploded in flight and plunged to the ground in desolate northeastern New Mexico yesterday, killing one of the two civilian test pilots aboard.

The other pilot aboard parachuted to safety. Air Force officials quickly clamped a tight security lid on the crash scene.

Both test pilots were employed by Lockheed of California.

Lockheed officials said William A. Weaver, of Northridge, Calif., parachuted to safety but that James T. Zwayer, of Lancaster, Calif., was killed despite the fact he ejected from the airplane.

The officials said the plane, a four-engine craft known as the SR-71, was on a routine flight and had left Edwards AFB early yesterday. The plane, built by Lockheed, had been undergoing tests since December, 1964. It was declared operational and some of its type have been turned over to the Air Force, which designates them A-111.

Gil Hinshaw, editor of the Tucumcari, N.M., Daily News, said the plane crashed on a high tableland near a small peak.

Hinshaw said a New Mexico state police sergeant confiscated pictures his photographer had taken of the new plane.

New Mexico state police said they had been telephoned from Richards-Gebauer AFB, near Kansas City, and told to slap total security around the plane until the Air Force could get to the scene.

The plane crashed about one to two miles east of the intersection of New Mexico highways 102 and 65, some 20 miles east of the tiny town of Mosquero.

Mrs. Albert Mitchell, wife of a former New Mexico national Republican committeeman, said her son A. J. Mitchell Jr., a pilot flew a ranch helicopter to pick up the survivor.

"He picked up the boy where his parachute landed and took him to Tucumcari," Mrs. Mitchell said.

Hospital authorities said Weaver was in "satisfactory condition."

He was quoted as saying he felt "kind of sore" but otherwise "all right."

"The plane exploded right over our ranch,' Mrs. Mitchell said. "It crashed in a road. My husband and some of the cowboys were out and saw the explosion.

"I heard it but nothing else.

"It just blew up and then the chutes were seen shortly thereafter. They took off immediately to go to the boy.'

"I cannot divulge where the plane came from at the present," Mrs. Mitchell said. "When they (the Air Force) tell us we can tell you we will but not until that time.

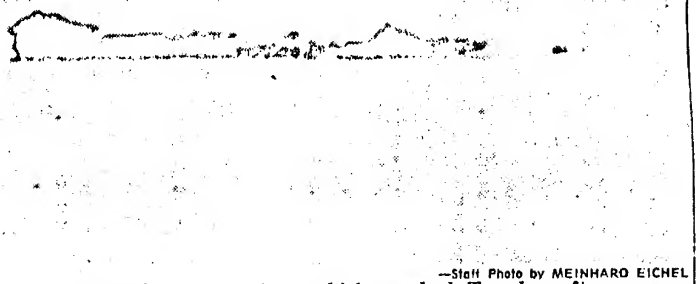
"They have asked us not to say anything."

Hinshaw said the plane came down on the Norman Libby ranch.

"It had windows," Hinshaw said. "We walked right up there and started taking pictures. Then some rancher told the state police sergeant we had taken some pictures and he took our camera.

"I asked him for the camera back and he took out the film."

AMARILLO DAILY NEWS, Amarillo, Texas,
27 Jan 1966



—Staff Photo by MEINHARD EICHEL

This is the SR71 piloted by two civilians which crashed Tuesday afternoon on the Albert Mitchell ranch in Hardin County, N.M. One of the pilots was killed and the other survived. This view of the wreckage was taken with a telephoto lens from the highway, about a mile away.

★ ★ ★ ★ ★ ★

Tucumcari Hub of Official Activity

TUCUMCARI, N. M. — The crash of a super-secret spy plane about 75 miles northeast of here Monday had resulted Wednesday in a military bivouac in the heart of this New Mexico city.

Jet-powered helicopters landed and took off in the middle of a block long section of a city street near the National Guard Armory while inside high-ranking military brass set up a command post resembling a total-war operation.

News media were denied any information about the command post activities while photographs were confiscated and citizens were warned not to "tell anything."

An estimate could not be made of the number of high-ranking military and "not military" personnel manning the post, but hotels, including the 60-unit Pow-Wow Motel reported capacity military registrations.

"We're completely full," said a spokesman of the Pow-Wow at mid-afternoon. By nightfall, the employe reported, "We've been doubling-up all evening."

While many of the personnel scurried back and forth to the wreck scene in the two transport-type jet cargo copters, others concentated on tightening security lids.

"They got me up in the middle of the night and demanded some photos we had taken before the Air Force arrived," said the publisher of the Tucumcari Daily News, Bill King.

"I called the State Police office the next day and asked them why a patrolman had taken them," he reported. "The sergeant said he was unaware it had happened.

"He told me he would order the photos returned. I saw a bulletin on police wires (about mid-morning) saying they were to be returned, but I don't expect to see them again."

The cloak-and-dagger security operations included orders to civilians having any information about the crash to keep mum to reporters.

"I'm really sorry," said rancher Albert Mitchell Jr., who flew the pilot of the craft to a hospital here in his personal helicopter. "I've been told I can't tell you anything about it."

At the Pentagon in Washington, Maj. Gen. E. B. LeBailly, director of information for the Secretary of the Air Force said, complaints of such tactics had "already resulted" in reprimands.

"I really don't understand what is happening there," said Maj. Tom Martin, a member of LeBailly's staff. "We are trying to get this straightened out and cooperate. But, we must also protect the (secret) equipment on that plane."

"It would seem that by now all of it should have been covered up. I'm surprised they won't let you take photos under their supervision."

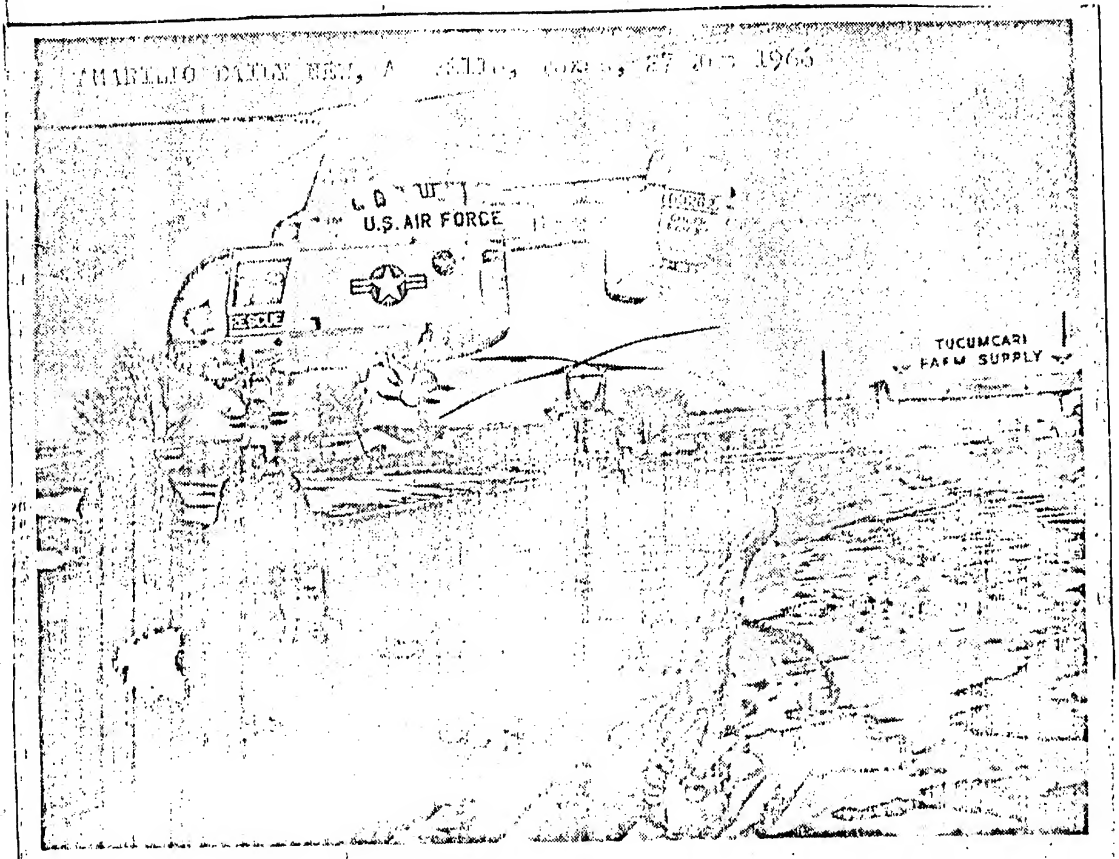
Advised of the Pentagon report, Mitchell said:

"That's the whole problem; this is not the military doing this."

He declined further comment — "under orders."

—Staff Photo by MEINHARD EICHEL

Rancher Albert Mitchell Jr. points to the sky where he first heard a popping noise and later saw parachutes coming down. He used the ranch helicopter to get to the area where the two SR71 flyers landed and took one 75 miles to Trigg Memorial Hospital in Tucumcari.



—Staff Photo by MEINHARD EICHEL

Helicopter Airborne

A jet-powered helicopter takes off from a barricaded section of a city street in Tucumcari, N.M., where a command post has been set up to supervise the investigation of the crash of a SR 71 about 75 miles away in rugged ranch country. Military and civilian officials set up the command post at the National Guard Armory.

★ ★

Spy Jet Wreck Probed

By WES PENDLEY
Of Our Staff

BUEYEROS, N.M. — A two-engine jet, military reconnaissance plane cruised slowly over a plateau several miles south of here Wednesday afternoon inspecting the site where its probable twin crashed Tuesday afternoon.

On the ground below, an inspection team composed of Air Force specialists and Lockheed Aircraft Corp. personnel combed the debris searching for clues as to what caused the crash of an SR71 experimental aircraft.

Other Pictures, Story, Page 27

Intermittent waves of B52 bombers also made frequent passes over the area, presumably taking photographs.

The spy plane, designed to replace the U2 of previous fame, crashed Tuesday. A Defense Department spokesman at Washington pinpointed the time as 2:32 p.m., New Mexico time.

James T. Zwayer of Lancaster, Calif., one of two civilians manning the aircraft, lost his life in the crash.

He and William A. Weaver, 37, of Northridge, Calif., had parachuted from the 2,000-mile-an-hour, high - altitude craft. Zwayer was dead when he hit the ground.

A witness to the crash, who arrived at the scene ahead of police, security agents and military guards, said Zwayer's pressure suit was torn and his oxygen mask appeared to have been ripped from his face "by some force."

First on the scene, however, was Albert Mitchell Jr., a rancher who witnessed the crash. He flew to where the two men were descending and landed in time to help Weaver collapse his chute and get out of the harness. At the direction of security agents, he later refused to comment on the condition of Zwayer's flight suit. He did say Zwayer was dead in his parachute harness when he reached him.

★ ★ ★ ★ ★ ★

JAMES T. ZWAYER

WILLIAM WEAVER

A

As reporters talked to Mitchell at his ranch home Wednesday afternoon, he was asked what the airplane looked like that had crashed.

"Well," said Mitchell, looking skyward, "if you want to see one, there goes one."

Overhead, a dip-nosed, swept-wing, craft passed by at low altitude approaching the crash scene. Its long black fuselage resembled an oversized cigar and its pointed nose the beak of some prehistoric flying reptile.

The SR71 is considered the most advanced plane of its kind in the world.

Mitchell said he and some ranch hands had been branding colts when they heard a crash in the sky. Looking up, he said, they saw the SR71 fluttering earthward "like a falling leaf" trailing a plume of white smoke and belching flames.

Other witnesses said the craft circled lazily as it fell, emitted a series of popping explosions and "winked" fire.

Mitchell said about four minutes after they first heard the loud crash, he was able to make out four parachutes. Two of them, apparently, were lowering the plane cabin capsule to earth.

Tight security has prevented the interview of Weaver — the only person who could tell about the harrowing descent from an estimated 80,000 feet.

Before security agents put a "hush" on Mitchell, he quoted Weaver as saying:

"Everything was going fine, and suddenly — whoof!"

Mitchell said Weaver told him he did not know what had gone wrong.

Mitchell flew Weaver to the Trigg Memorial Hospital at Tucumcari in his helicopter and landed in the parking lot outside the door. Weaver was admitted for observation but was not believed to be seriously injured.

Reports Wednesday indicated the RS71 was flying at an altitude of 80,000 feet, or higher, at an estimated speed of 1,800 miles per hour, when it somehow was disabled.

Also, an Air Force officer who refused to give his name, said fastest speed prior to Tuesday, at which a pilot had ejected from an airplane was 800 miles per hour.

Tight security was clamped on the crash site on the Norman Libbey ranch, with only Libbey and his ranch hands being allowed in and out of a pasture gate leading to the plateau where the RS71 came to rest.

An Air Force sentry armed with an M-2 carbine would not permit photographers or reporters to pass. An Office of Security Information lieutenant said to a Daily News reporter:

"There is still a hell of a lot of classified information in that field."

A photographer was allowed to take pictures from New Mexico 102, where the gate leads to the crash scene about a quarter of a mile away.

The SR71, from that distance, seemed to be generally intact with the exception of the nose section, fragments of which were scattered about the terrain.

Zwayer's body was transferred to the Doughty Funeral Home at Tucumcari Wednesday afternoon after it had been X-rayed at the hospital.

An autopsy was performed by Lt. Col. J. Gordon Webster of Washington, D. C., consultant in pathology to the surgeon general and a member of the Air Force Air Crash Medical Investigating Team.

The body was not visibly mutilated. There were strong indications that Zwayer died from oxygen starvation.

The body had lain where it fell, in an ice-crusted, muddy pasture, until early Wednesday morning. It was guarded by state police.

An ambulance from Cannon Air Force Base near Clovis took it to the Tucumcari hospital at that time.

Marvin Doughty, funeral home operator, said security agents had forbidden him to talk about the condition of the body or the apparent cause of death.

Libbey reported that minutes after the plane struck the ground, two Air Force jet fighters were circling the area.

Newspaper photographers who arrived at the scene before the area was cordoned off had film exposed by them confiscated by state police and given to Air Force personnel.

The Air Force has set up a command post at the National Guard Armory in Tucumcari to oversee a thorough investigation.

The SR71 is capable of flying high enough to scan 60,000 square miles of earth. It is a slightly longer and heavier model of the YF 12A, also built by Lockheed.

It was first called the A 1-11 when its development was announced by President Johnson.

Air Force security guards will remain at the crash site until the on-the-scene investigation is completed.

Air Force personnel from the Amarillo Air Force Base and Cannon Air Force Base, including medical, legal, and flying safety specialists, have been rushed to the scene.

Amarillo Air Force Base sent 50 military personnel and the following equipment to the crash scene: 10 trucks, a bulldozer, a forklift, two flat-bed trailers, three troop carrier trucks borrowed from the National Guard and a fuel truck.

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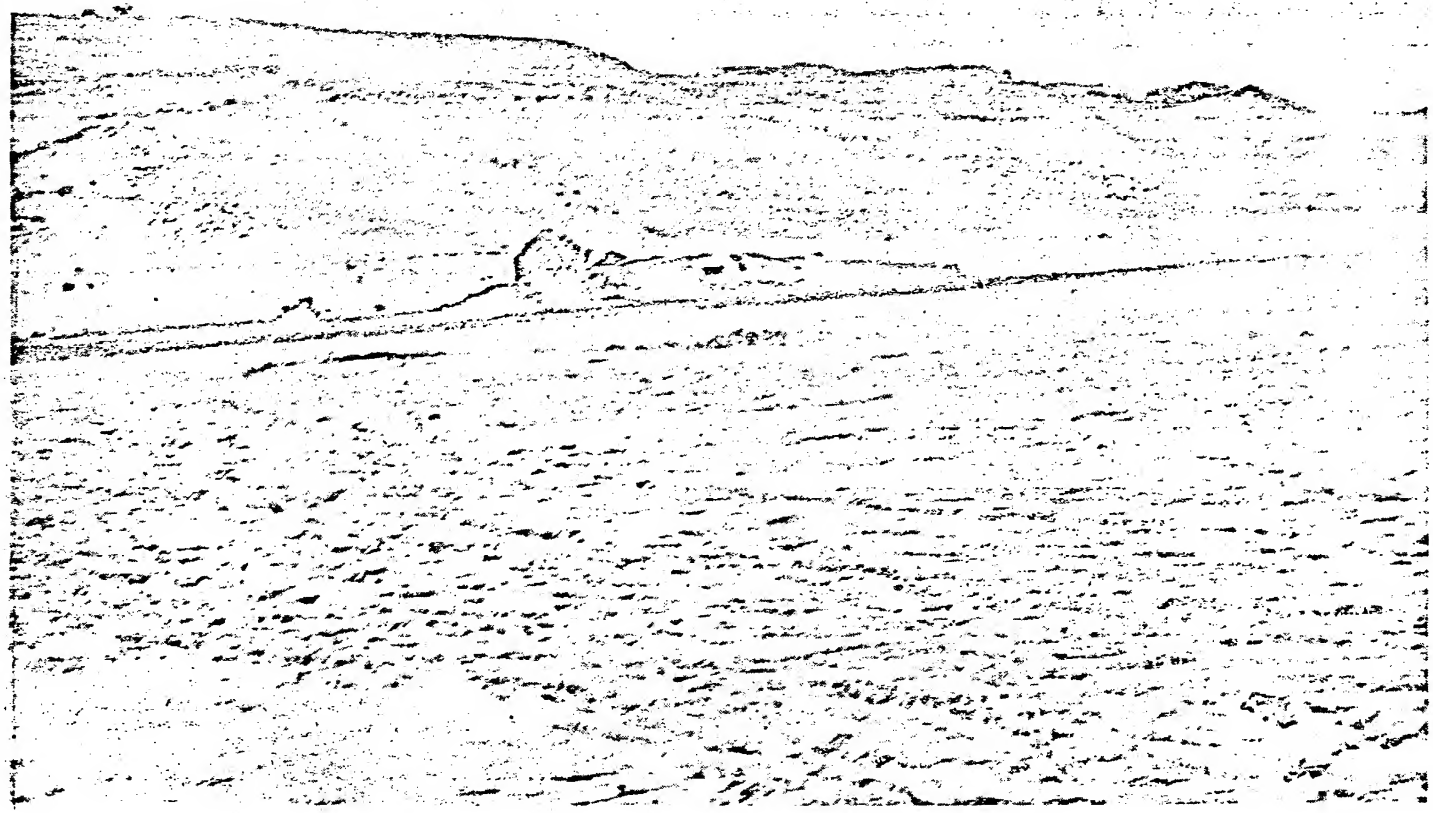
TUCUMCARI DAILY NEWS
Tucumcari, N.M. 28 Jan 1966



THIS IS IT— the only close up, civilian news photograph of the downed SR-71 spy plane in a pasture about 20 miles east of Mosquero. The photo, first confiscated by State Police, was held until late yesterday by Air Force officials probing the cause of the crash. The aircraft's tail section is to the left of the photograph. Note openings, that could be windows, along the fuselage. The main body of the craft appears to be in tact.

--Photo By Daily News Staffer Jimmy Crocker

Approved For Release 2001/08/29 : CIA-RDP71B00590R000100100001-4

AIR FORCE CALLS PRESS CONFAB

Pilot Of Spy Plane To Be Buried Monday

The test pilot who died in Tuesday's crash near Mosquero of the super spy-reconnaissance SR-71, the world's fastest aircraft, will be buried Monday in Arlington National Cemetery with military rites.

Doughty Funeral Home, where the body has rested since the crash, announced today that funeral services for James Pershing Zwayer, 48, a test pilot for Lockheed Aircraft at the time of his death, will be held tomorrow at 1 p.m. in the Shannon Funeral Home in Ft. Worth, Tex.

Zwayer's body was shipped by rail from Tucumcari last night after weather conditions prevented a Lockheed airplane from flying the casket out of the city's Air Hub.

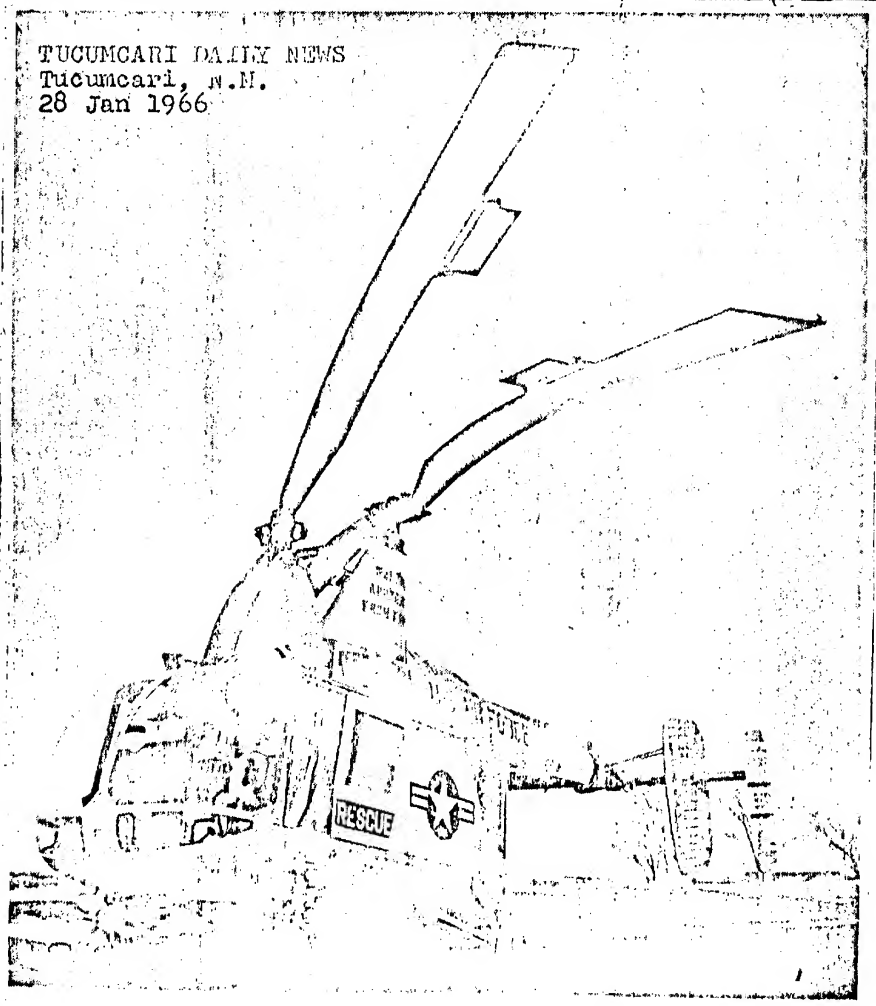
The dead man is survived by his widow, Lucille, and three daughters, Nancy, Linda and Carol, all of Lancaster, Calif.; two brothers. B.E. Zwayer of Westchester, Ohio, and Roger of Maderia, Ohio; his parents, Mr. and Mrs. Clyde H. Zwayer of Bradenton, Fla.

A Doughty Funeral Home spokesman said that the funeral was being held in Ft. Worth because the widow is a former resident of that city.

Zwayer was an Air Force colonel until Sept. 30, 1964 when he resigned to join Lockheed.

It is believed that Zwayer may have died while ejecting from his super secret aircraft before it plummeted to earth on the Norman Libby Ranch about 20 miles east of Mosquero at 2:36 p.m. Tuesday.

An autopsy, performed at Doughty's Wednesday by a team of physicians and pathologists, revealed that cause of death was a broken neck and a cerebral hemorrage.



WATCH FOR HELICOPTERS could well be the wording on street signs in the Hancock and Grove area near the National Guard Armory in Tucumcari where the U.S. Air Force roped off one block of Hancock Street for a landing strip. The jet-powered H-43 Kaman "Husky" rescue choppers like the one above are transporting men and equipment to the crash scene of the top secret SR-71 spy plane which plummeted to earth Tuesday about 20 miles east of Mosquero.

second civilian pilot, William A. Weaver, 37, Northridge, Calif., parachuted to safety from the doomed SR-71 and was brought by helicopter, flown by Rancher Albert Mitchell Jr., to the Dr. Dan C. Trigg Memorial Hospital where he was found to be insatisfactory condition and later released.

Col. Horace D. Templeton, commander of the Tucumcari-based team probing the cause of the crash, was to meet today at 3 p.m. with newsmen from a wide area to answer their questions. The press conference was to be held in the Pow Wow Restaurant.

Templeton, from Edwards Air Force Base, Calif., where the ill-fated SR-71 flight originated, yesterday released Daily News films of the crash that were confiscated by the State Police and later the Air Force. Reportedly, the film contains the only civilian news media photos taken of the downed aircraft.

State Police said later they planned to release the film following a protest from the Daily News, but Air Force officials intercepted the undeveloped roll.

Today in Santa Fe, State Police Chief John R. Bradford released the following policy statement regarding the law enforcement agency's roll at military plane crashes:

"Generally speaking, our objective is to maintain safety at the scene of an aircraft crash to prevent pilfering and safeguard military facilities until the military can take over. As far as pictures, we generally have no concern here other than the fact that if pictures are being taken, the military should know about it.

"In some of these accidents classified status applies to the equipment and there should be precautions to safeguard the nation's classified position to keep material from falling into the hands of unauthorized persons. We don't intend to interfer with the news people's taking of pictures. The only angle as far as the news people are concerned is the safety factor. Such things as pop-out ejection seats or weapons could present dangers. And the state police have no way of knowing whether there is a nuclear weapon aboard or not—the military doesn't keep us posted on what the score might be but when we get a report of highly classified situation it's questionable just exactly what steps you do take until the military comes and takes over."

The SR-71, capable of speeds at over 2,000 mph and heights of 80,000 feet, was on a routine flight when the accident occurred. Development of the highly secret craft is believed to have cost $1 billion.

The team investigating the crash maintains headquarters in the Tucumcari National Guard armory.

SR71 Investigators Set Press Briefing

AMARILLO DAILY NEWS, Amarillo, Texas 28 Jan 1966

From Our Eastern New Mexico Bureau

TUCUMCARI, N.M. — Col. Horace D. Templeton, head of the investigative team probing the crash of a super-secret SR71 spy plane, has called a news conference for 3 p.m. today in Tucumcari.

The conference was called Thursday shortly after pilot William A. Weaver, 37, who reportedly said he bailed out "in excess" of 80,000 feet, was returned to Edwards Air Force Base, Calif., by military plane.

The body of his co-pilot, James T. Zwayer, 47, killed in complications resulting from the bail-out, was later flown to Fort Worth for funeral services to be followed by burial in Arlington National Cemetery.

Both men were civilian test pilots employed by Lockheed Aircraft Corp. They were on a routine test flight out of Edwards AFB Tuesday when the plane crashed about 75 miles northeast of here.

An interview with Weaver, earlier authorized by Air Force information director Maj. Gen. E. B. LeBailly, was refused by Col. Templeton.

"I don't care what the Pentagon says," said Col. Templeton. "This is a classified project and no one is going to talk to that pilot."

In Los Angeles, Associated Press reporters were told by a Lockheed spokesman that Weaver did not want an interview and would not be allowed to say anything anyway.

Col. Templeton, a former Air Defense Command spokesman now connected with the SR71 project, said he would attempt at the news conference to clear up questions surrounding the crash, the first reported for the 2,000-mile-per-hour plane.

Also on hand will be members of the Air Force Inspector General's office and personnel from Edwards Air Force Base and Lockheed Aircraft Corp. It will be held at the Pow-Wow Motel.

More than 100 persons have been investigating the crash, including representatives of Cannon AFB, N.M., Norton AFB, Calif., Lockheed and officials from Washington, D.C., and Houston.

The Air Force has remained mum on details of the crash and the investigation since the incident. The crash area has been closely guarded, and newsmen have been barred.

Time of services for Zwayer, father of three, have not been announced. Burial in Arlington for the retired Air Force colonel was set for 10:30 a.m. Monday.

Zwayer, whose wife Lucille is a native of Fort Worth, is a resident of Lancaster, Calif.

AMARILLO DAILY NEWS, Amarillo Tex. 29 Jan 1966

Crash Remains Mystery

By WES PENDLEY
Of Our Staff

TUCUMCARI, N. M. — The cause of the crash of an SR71A reconnassance plane while on test flight near here may never be revealed, Col. Horace A. Templeton said Friday.

Col. Templeton, in charge of a team of investigators probing the crash 75 miles northeast of here Tuesday, made the statement during the first press conference on the crash.

"We can't make any statements as to the cause until all the data is assembled," was one of his opening remarks. "We don't expect a final report for several weeks."

Asked if the findings would then be revealed at the Pentagon, he said that all further information would come from the command center "but I doubt the cause will ever be revealed."

Col. Templeton apologized for "inconvenience and discomfort" caused citizens and the press because of the confusion at the outset of the investigation, including denial of an interview with pilot William A. Weaver, 37, of Northridge, Calif.

He said that word of Pentagon authorization of the interview failed to reach him until several hours after a Daily News reporter was told it was being arranged.

Col. Templeton would offer only that the pilot and dead co-pilot, James P. Zwayer, 47, of Lancaster, Calif., were not in capsules in the bail-out.

"They were wearing only space suits similar to those worn by astronauts," he said. "I cannot tell you anything he (the pilot) said."

Templeton also refused to "confirm or deny" a statement reportedly made by Weaver shortly after the crash that they were "in excess" of 80,000 feet and traveling about 1,800 miles per hour when they bailed out.

"They manually ejected themselves," Templeton said. "As has been reported, Zwayer was dead in his chute when he hit the ground.

He refused to comment on the cause of death, but informed sources said Zwayer's neck was broken and his lungs and heart were collapsed. The official verdict is expected to be death by a broken neck.

Criticism of press stories by Templeton was in the form of "misleading." He said none of the news information had been detrimental to security restrictions.

Met with demands of explanation for his previous refusal to make available any information concerning the crash, he cited "confusion and Chaos" at the outset of the investigation and offered an apology for resulting "confusion and discomfort."

Many replies to direct queries were evasive. When asked about reports that a similar craft to the downed one was seen overhead the next day, he said he did not know what the plane was.

"I'm sure it was not another SR12A," he said. "I asked that all aircraft stay clear of the area, so I really don't know what it was. I don't know what all those (jet bombers) were doing overhead."

He added that he felt certain that test flight of SR12A crafts over the area would resume shortly, stating that "We make a soft sonic boom, but we like to do it in lesser populated areas."

Returning to questions about the investigation, Templeton reported that the wreckage is being replaced into a truck convoy to depart in about two-days for Edwards Air Force Base, Calif.

"We've got a bit jigsaw puzzle to put together out there," he said. "We have to find the pieces and assemble them. We can't deduce what's going on."

Templeton was also evasive on questions concerning eye-witness accounts of the crash. Asked if the plane had not seemed to be under some kind of power as it descended, he replied, "That's what we're trying to figure out."

He gave indications that this was not the first difficulty encounter during test flights of the spy plane. "The purpose of test flights is to iron out any difficulties and try out new equipment."

Secret instructions on precautions to be taken in the event of a crash or forced landing of one of the planes were given to several area Air Force bases more than six months ago, he said.

ALBUQUERQUE JOURNAL, Albuquerque, N.M. 29 Jan 1966

Cause of SR-71-A Crash Unknown, Official Says

TUCUMCARI (UPI) — Col. Horace A. Templeton, head of the Air Force development program for the SR-71-A reconnaissance plane, said Friday the supersonic plane would not be grounded because of Tuesday's mysterious crash.

One Lockheed test pilot was killed and another man injured Tuesday when the world's fastest jet crashed near an Albert ranch.

Templeton, speaking at a press conference at Tucumcari, said the SR-71-A would be shipped by truck to Edwards AFB, Calif., for a complete evaluation and investigation.

"Frankly, we do not know the cause of the crash," Templeton said.

In other developments, military graveside rites were announced Friday for pilot James P. Zwayer. Officials said he would be buried in Arlington National Cemetery.

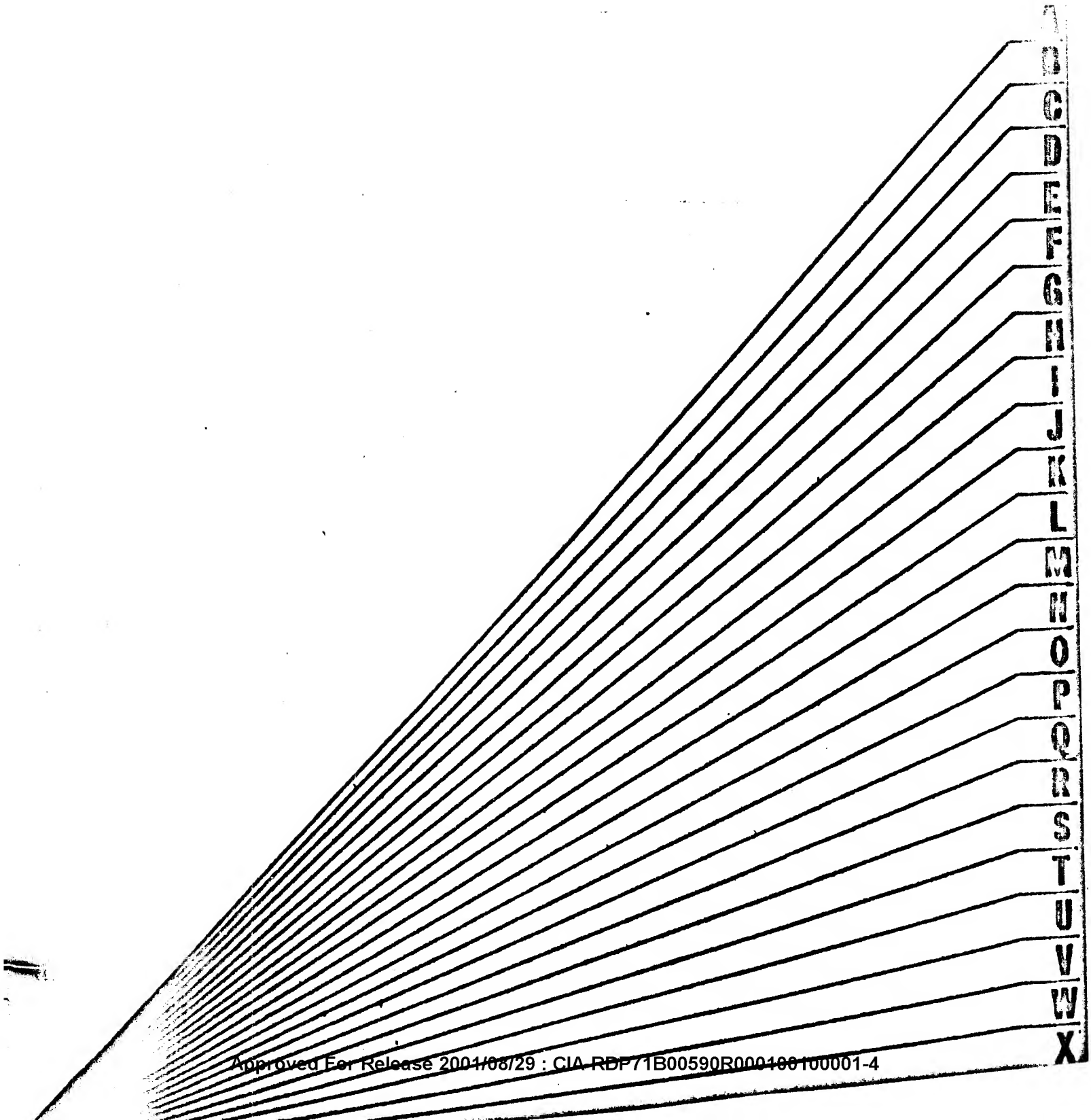
Funeral services will be held in Fort Worth today, because his wife formerly lived there.

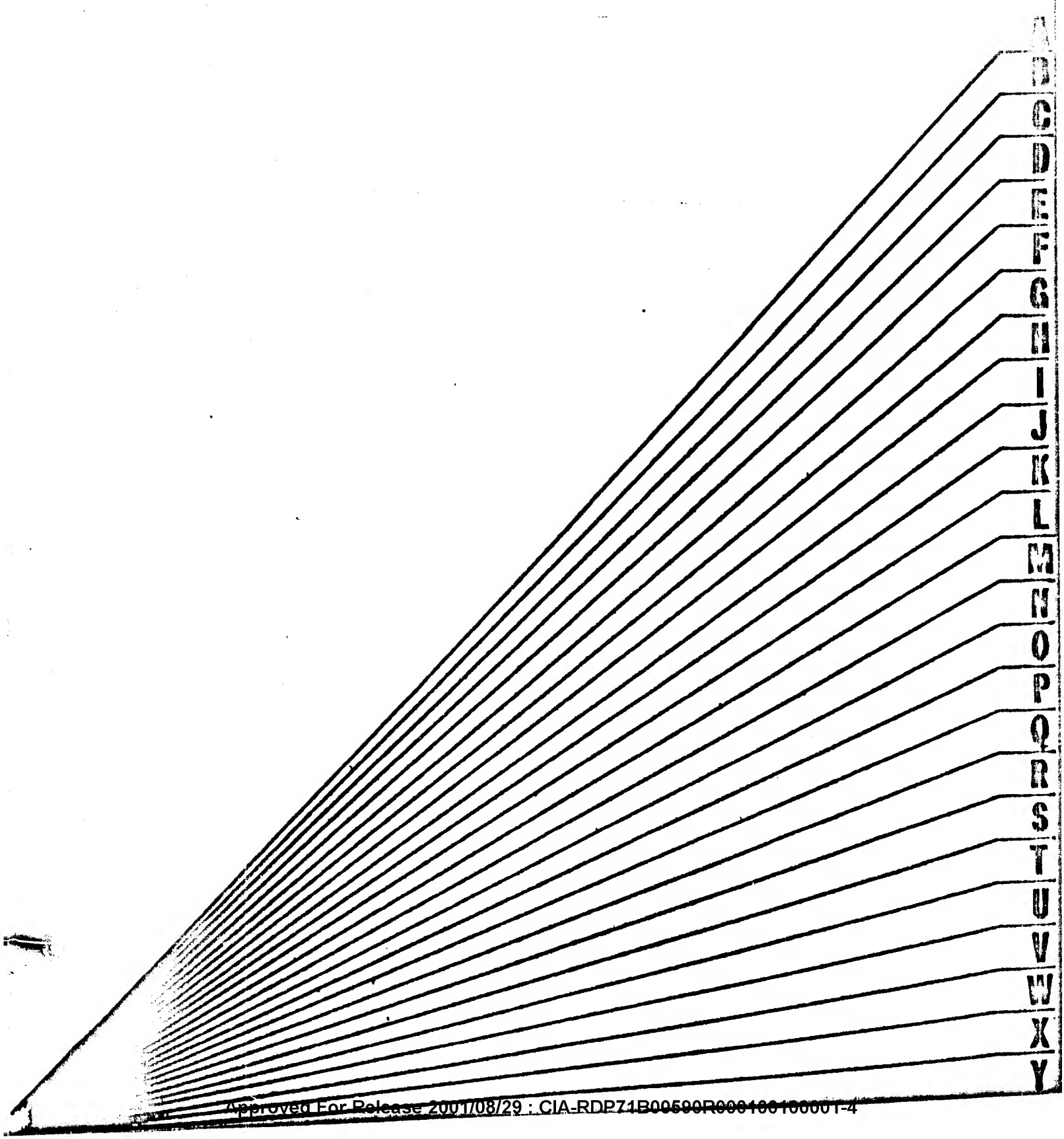
The plane, one of three prototypes including an interceptor and trainer version, has been developed since before the President's official announcement of its existence last June, he said.

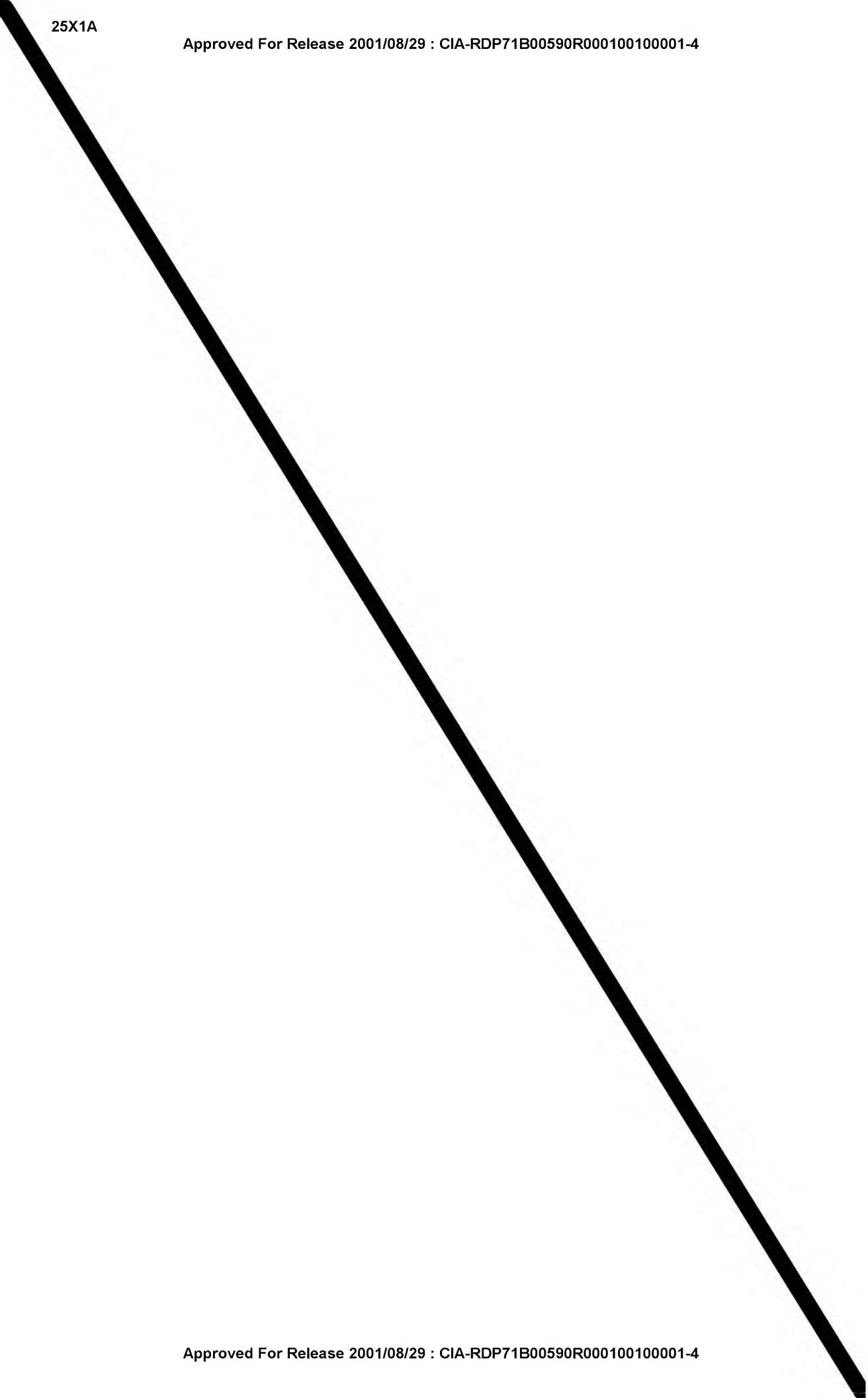
The titanium aircraft is being developed by Lockheed Aircraft Corp. to be used by Strategic Air Command. The two pilots were both civilians.

Col. Templeton is chief of the F12-SR71 Systems Program Office at Edwards AFB. He also is chairman and official spokesman of the investigative board.

President of the board and chief investigator of the crash is Col. James G. Fussell, deputy chief of the flight safety division of the Directorate of Aerospace Safety, Office of the Inspector General. He was present at the conference.







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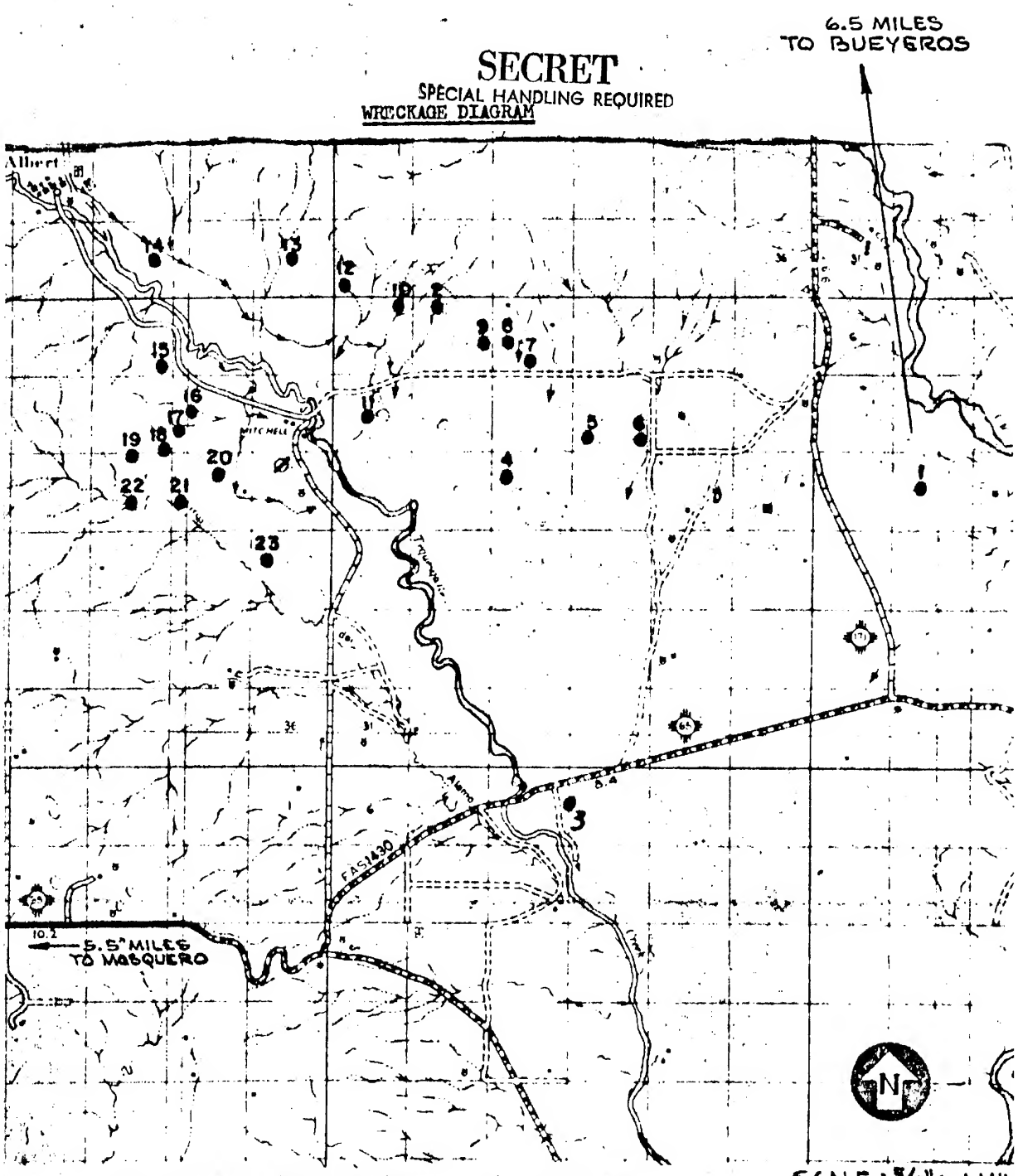
WRECKAGE DIAGRAM



1. Aft fuselage, wings & engines
2. Fuselage nose section
3. Aircraft drag chute riser
25X1A 4. [redacted]
5. Ejection seat drogue chute
6. Piece of titanium
7. Lens and film (radar recorder)
8. Tech obj. camera
9. mission recorder
10. ½ of EMR
25X1A 11. [redacted] landing spot
12. Rear canopy
13. Rear seat
14. Front canopy
15. Aircraft tubing
16. Aircraft tail cone
17. Mission recorder (B tape deck)
18. Chine section
19. Mission recorder (A tape deck)
20. Chine section
21. Chine section
22. Chine section and mission recorder cover
23. Aircraft tubing

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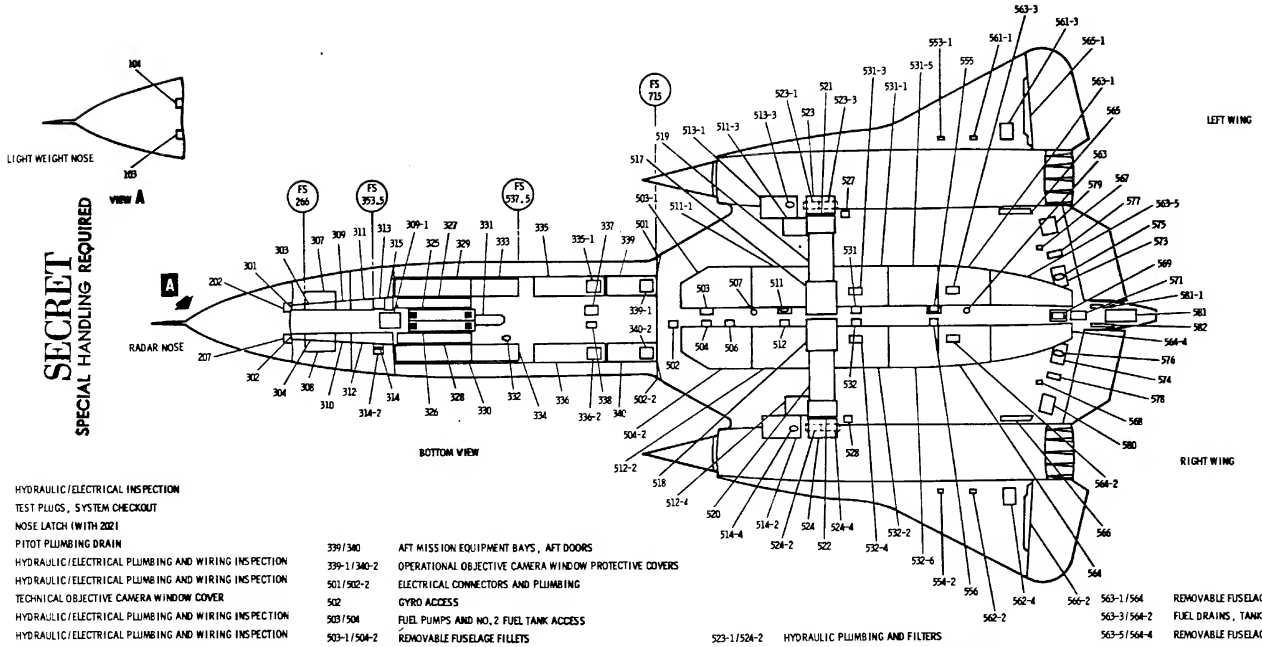

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SPECIAL HANDLING REQUIRED

SECRET
SPECIAL HANDLING REQUIRED

CODE	
103/104	HYDRAULIC/ELECTRICAL INSPECTION
202	TEST PLUGS, SYSTEM CHECKOUT
207	NOSE LATCH (WITH 202)
301/302	PITOT PLUMBING DRAIN
303/304	HYDRAULIC/ELECTRICAL PLUMBING AND WIRING INSPECTION
307/308	HYDRAULIC/ELECTRICAL PLUMBING AND WIRING INSPECTION
309-1	TECHNICAL OBJECTIVE CAMERA WINDOW COVER
310	HYDRAULIC/ELECTRICAL PLUMBING AND WIRING INSPECTION
311/312	HYDRAULIC/ELECTRICAL PLUMBING AND WIRING INSPECTION
313/315	LIQUID OXYGEN SYSTEM FILL AND DRAIN
314/314-2	UHF ANTENNA, RETRACTABLE
325/326	NLG DOORS
	ELECTRICAL EQUIPMENT (E-BAY)
328	RADIO EQUIPMENT (R-BAY)
329/330	FORWARD MISSION EQUIPMENT BAYS, FORWARD DOORS
331	NLG TRAILING DOOR; TANK NO.1 FWD FUEL PUMPS
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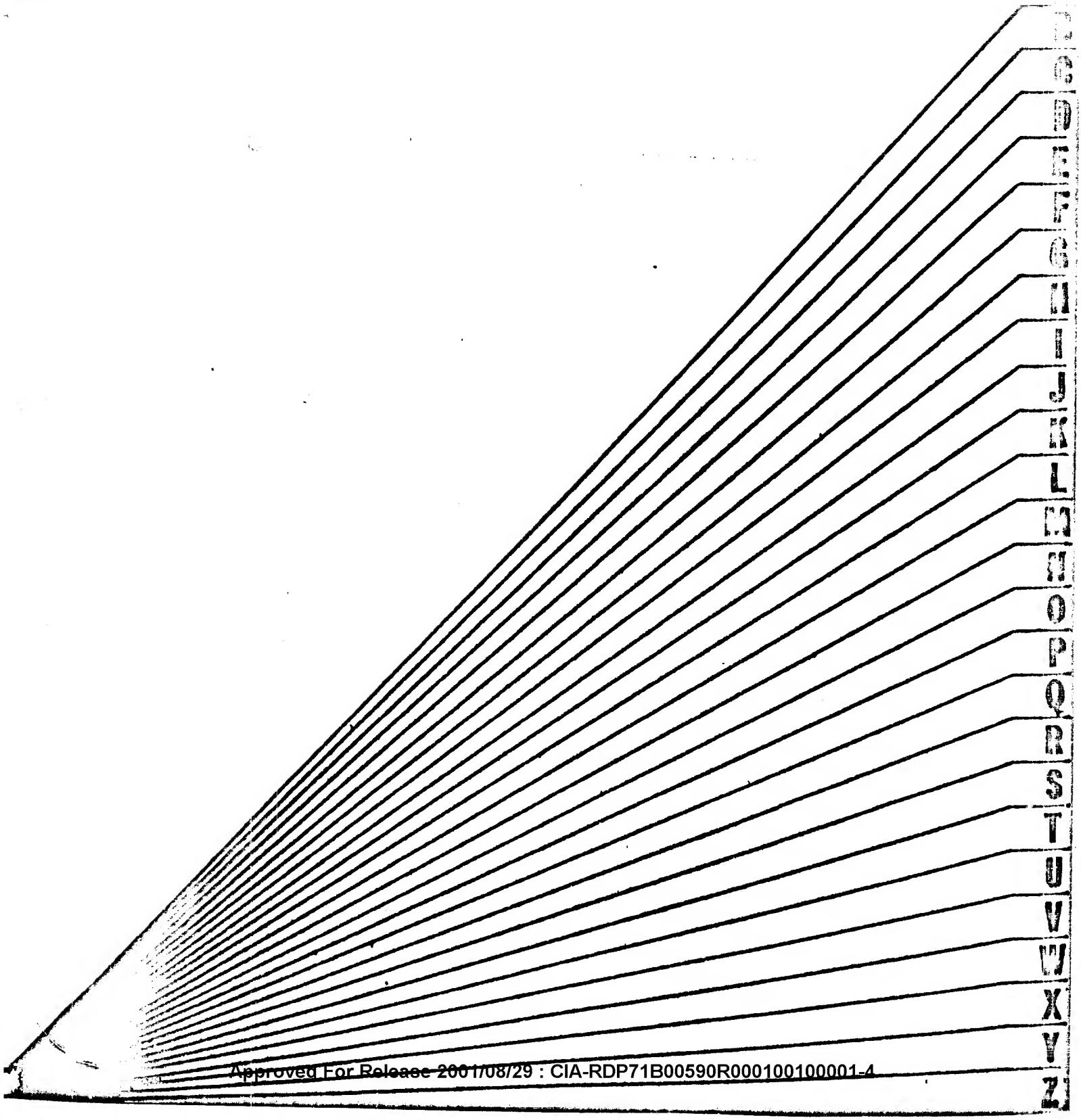
Figure 1-7. Access Provisions (sheet 1 of 5)



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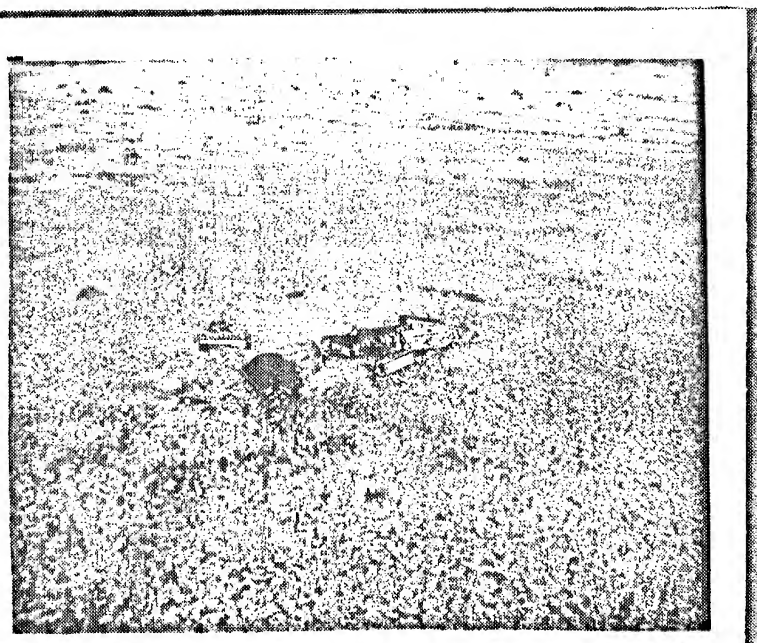

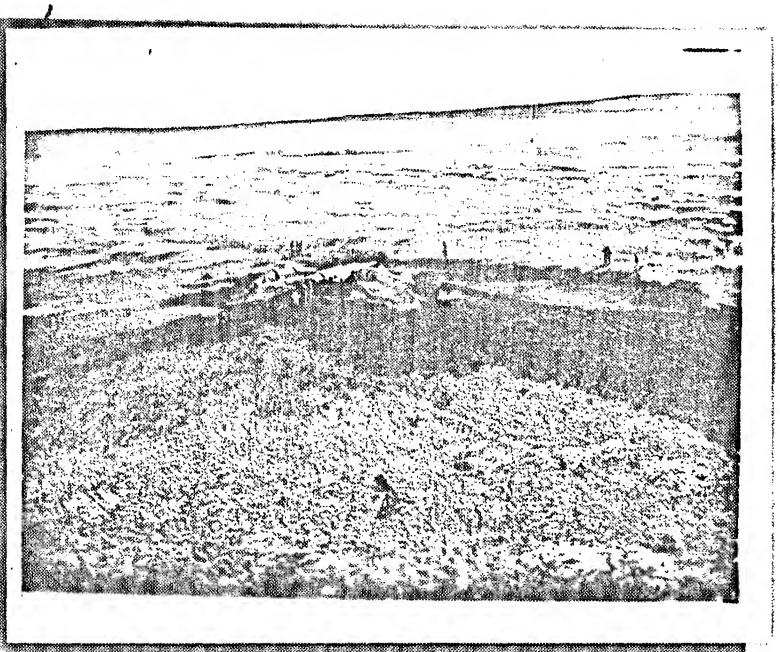

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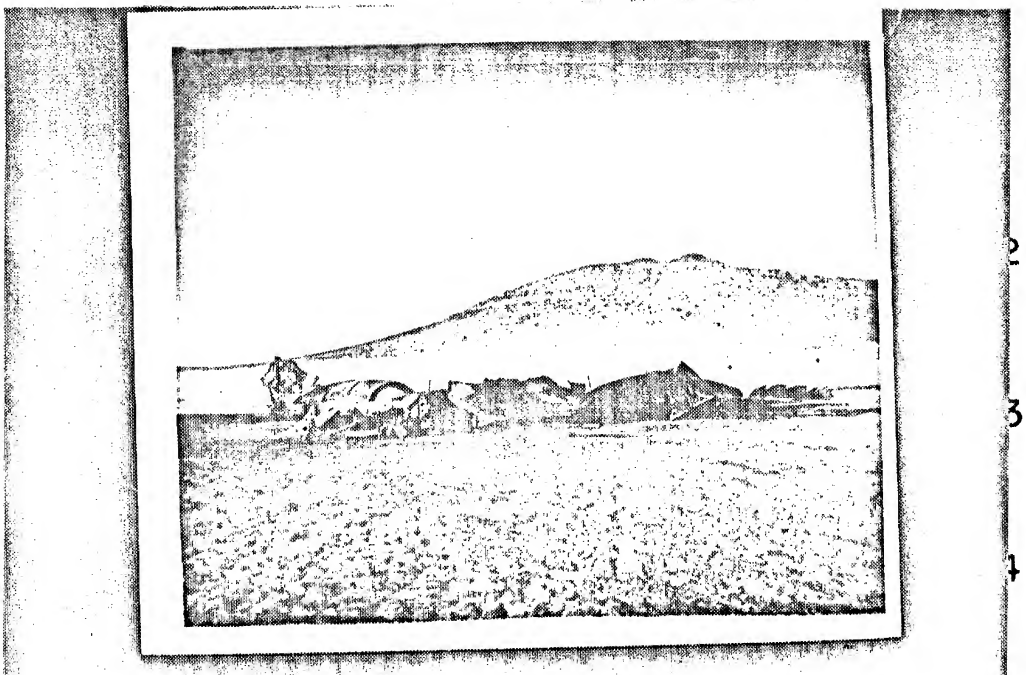

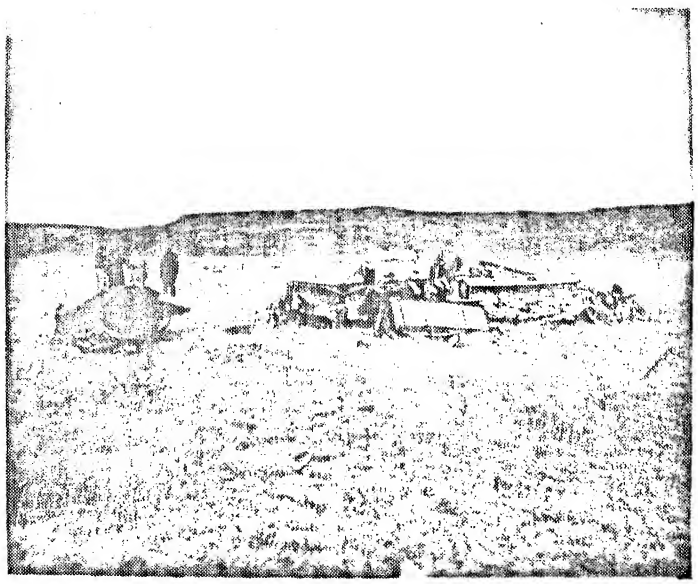

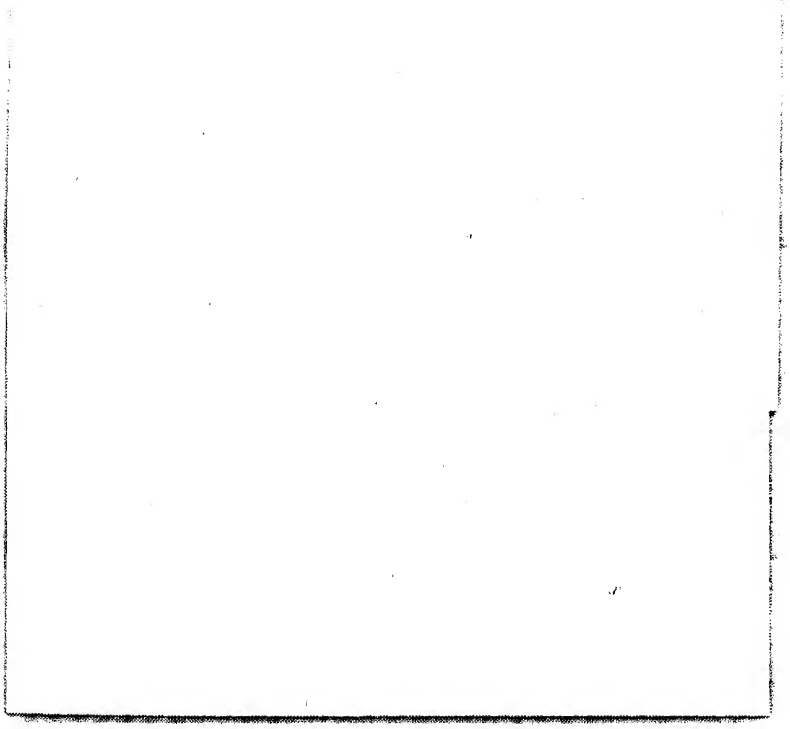

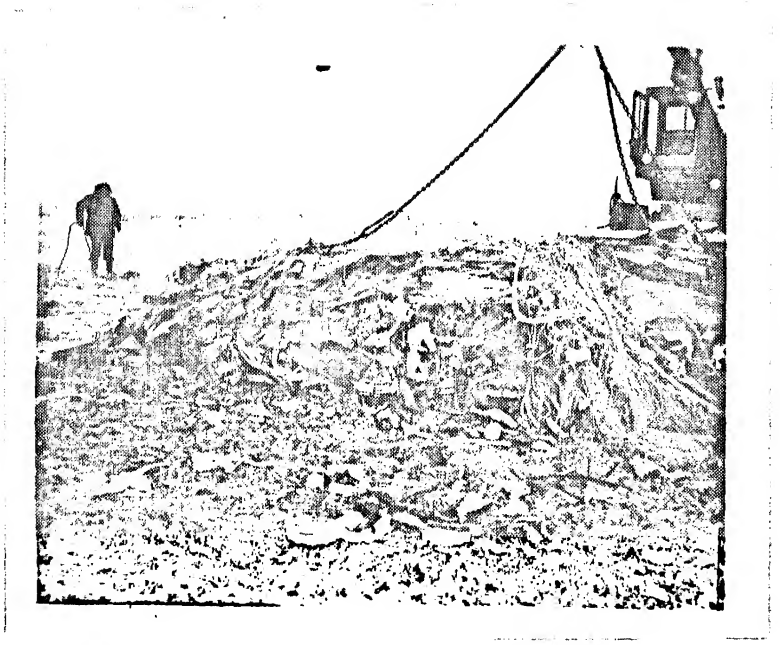

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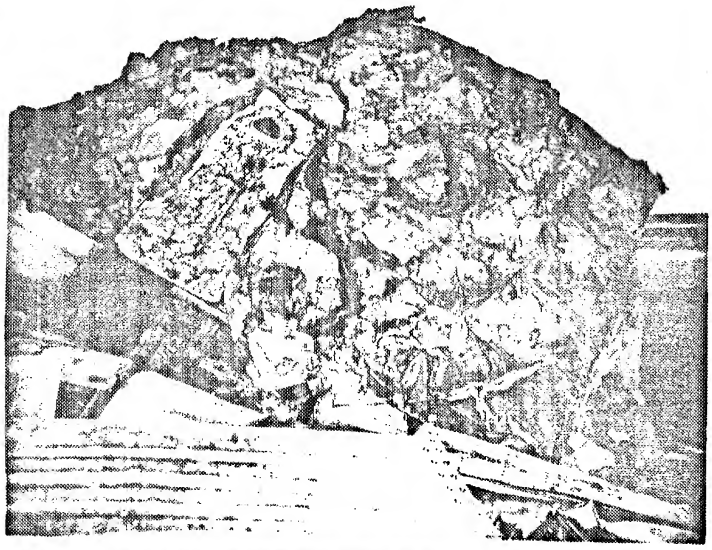

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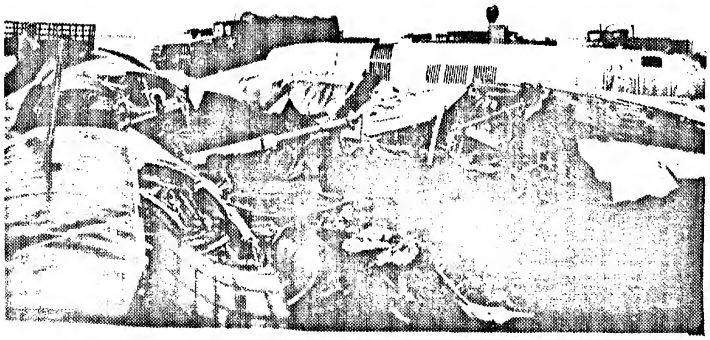

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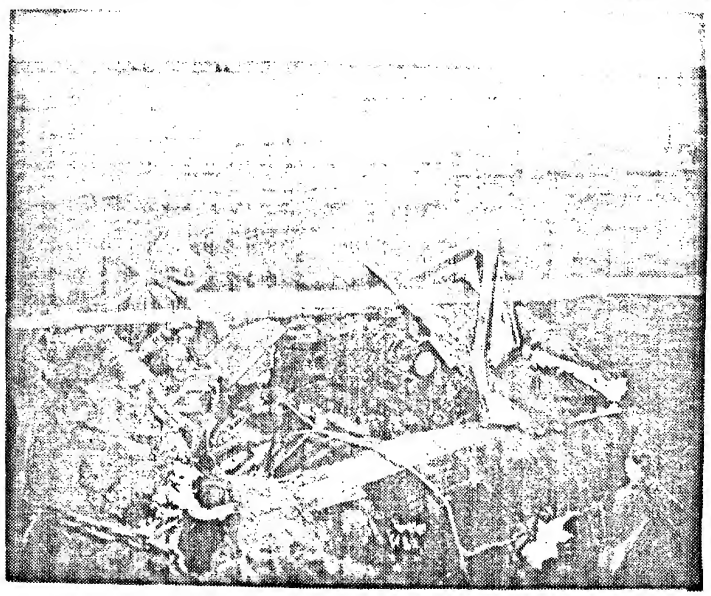

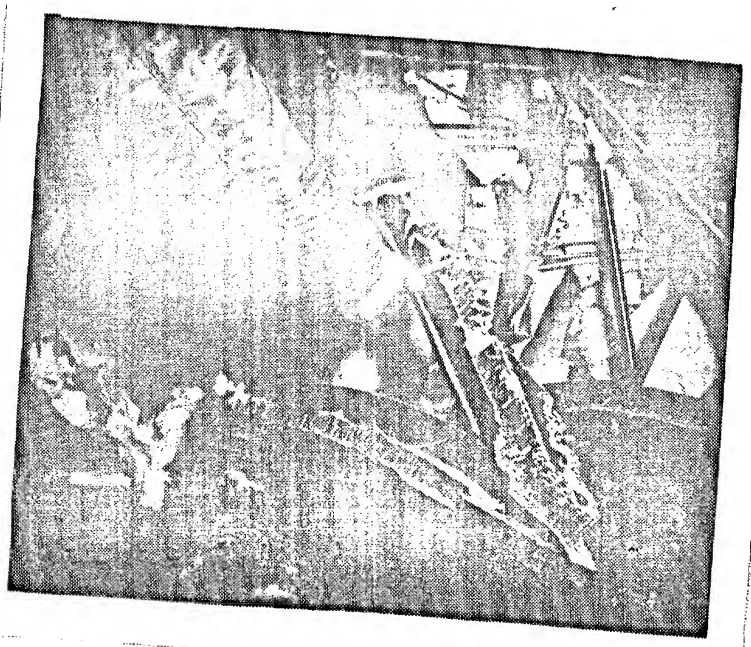

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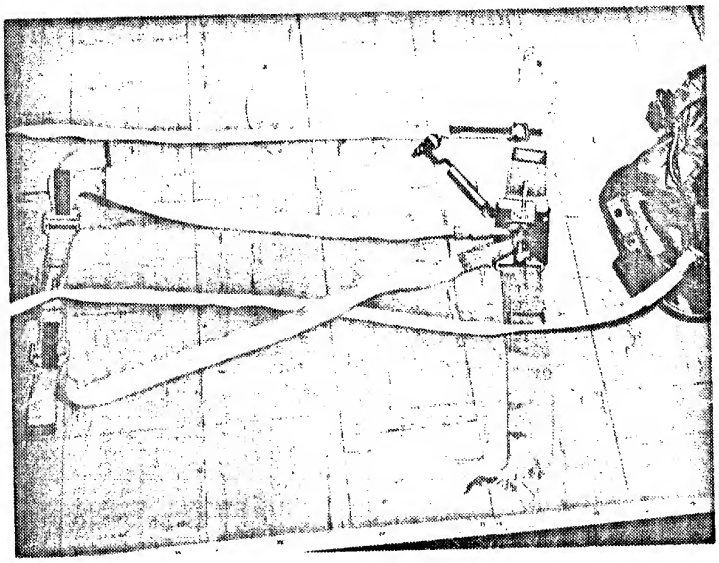

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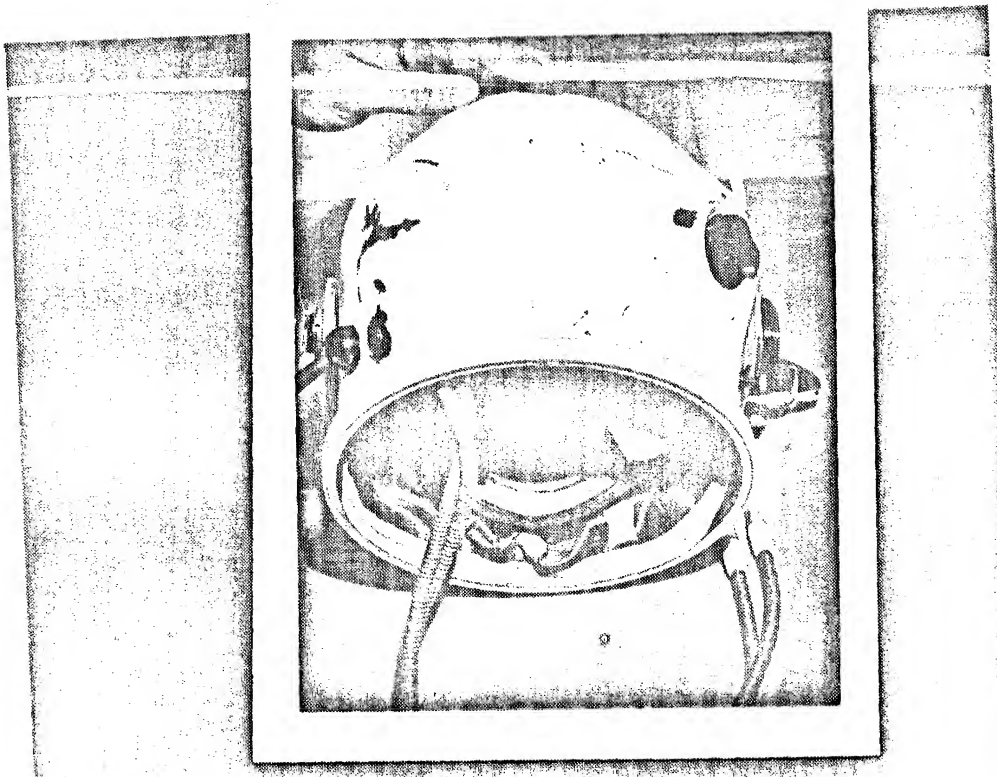

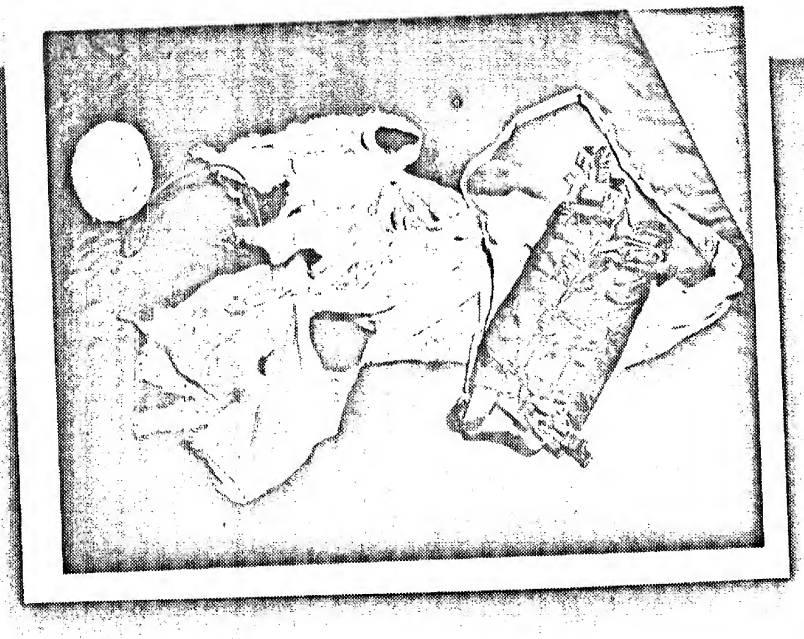

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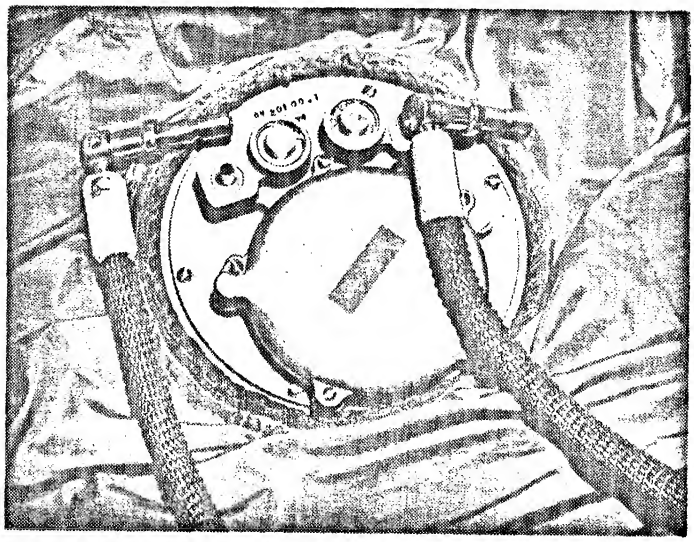

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INDEX OF PHOTOGRAPHS

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2 - Aerial view of the nose section.

3 - Aerial view of rear fuselage. NOTE: Right nacelle broke at ground impact.

4 - Front view of main wreckage.

5 - Forward part of fuselage.

6 - Forward fuselage after roll over.

7 - Ground burning of right fin.

8 - Close up of rear fuselage and right nacelle.

9 - Forward cockpit after roll over.

10 - Typical chine break up showing washers under rivets pulled up.

11 - Typical honeycomb separation.

12 - Restraint harness and stabilization chute risers.

13 - S-901 helmet.

14 - Pilot Chute of stabilization chute.

15 - Suit controller

16 - External canopy release slide tube showing direction of cable imprint.

17 - Skin upper left side rear of forward fuselage section, station #535.

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